



amateur radio

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JANUARY
1967

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Propagation of Amateur Signals Allied With Ionospheric Predictions

F. T. HINE,* VK2QL

BY listening to many Amateurs, both v.h.f. and h.f., I am convinced that they miss one of the most interesting facets of Amateur Radio—the study of propagation of the signals they transmit. They are quite content to follow the pattern of those who pick a racehorse by the use of a pin.

How many have proudly displayed their station to visitors, received the usual question, "Who can you talk to?" and this type of thing follows: "The whole world." "Well, let us hear Timbuctoo." The receiver is promptly turned back and forth looking for the station from Timbuctoo, when in general, to use a typical Aussie phrase, "They have Buckley's chance of finding one."

I hear Amateurs on the band saying it won't be long before 10 metres is wide open for DX again. I won't go so far as to refer to Mr. Buckley here, but from information I have received from the Prediction Service, and which you can study in Sept. "A.R.," it does not look like 10 metres will be a good DX band in the coming cycle.

SUNSPOT ACTIVITY

Prior to the last sunspot minimum, there were two schools of thought, one with the theory that the next cycle would exceed 1958 in sunspot activity, the other that we would not again reach high sunspot activity in the present century. Neither of these two camps were guessing, but trying to make a forecast from records available over many years.

Now that we are well past the minimum, it looks as though the second group will be right as far as the present cycle is concerned.

The subject of propagation, allied with predictions, is an enormous subject and I must assume that readers have some knowledge of what goes on in the ionosphere and its effect on Amateur communications. I do not profess to be a "back room boy" on this subject and can only pass on what I have learned by reading and on-the-air experience. I have to change my thinking from time to time, and will need continually to do so as information from satellites is generally available. If you have access to, and Divisional libraries should have copies, read the "Sun Spot Story" in "CQ" for April, May and June, 1961. This was produced, due to demand, into one publication and made available for interested people by "CQ". I find myself referring to my copy from time to time.

It is interesting to note that some of the points made in the "Sun Spot Story" in regard to the expected minimum period were not borne out. One of these was the minimum period would probably occur in May 1965. If you refer to the tables mentioned above, you will see the lowest smoothed sunspot number occurred in Oct. 1964 and the lowest mean in July 1964. Further reading is available from your Division

by borrowing the copy of the handbook issued by the Ionospheric Prediction Service (I.P.S.).

I for one expected very good DX conditions on 3.5 Mc. during the last minimum period and when this did not eventuate, discussed the matter with a member of the I.P.S. in Sydney to learn that the absorption was not a great deal less on that band during varying periods of the cycle. I learned that if we were able to have a frequency within the region of the 10 Mc. band, we would have a good all round working band. This makes sense when one considers how reliable the 9-10 Mc. s.w. broadcast band is.

Just reverting back to sunspots briefly, we find the peak for all time was just over 200 in 1958. The next highest was the previous cycle in 1947 with a sunspot number of 155, and in 1778 the number was also 155; these were the highest over a period of 169 years. In 1804 and 1816, the peak number reached only 45 and in 1906 approximately 75. The forecast from Zurich for the present cycle maximum is 100 and due to occur in the latter part of 1968. This forecast is similar to that actually occurring in 1917, and approximately half of the last peak.

The graphs I have (see "CQ" May 1961) commence from the year 1750 and show the rise and fall of each cycle. No two cycles, although known as 11-year cycles, are the same—the shortest being 9 years and the longest 14 years. The ascending period of a cycle varies between 2.6 and 6.9 years, the last cycle rising in 3.9 years. The descending period varies between 4 and

10.2 years. This may sound a little "Irish," but it is possible at the minimum period to have spots on the sun from the old and the new cycle at the same time and this occurred at the last minimum period.

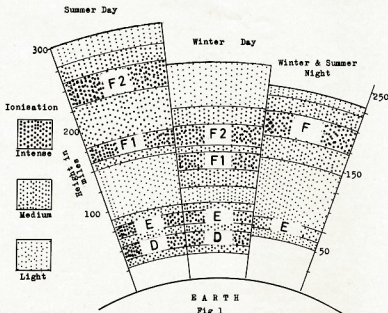
PREDICTIONS

Predictions are concerned with the propagation of radio signals by reflection from the ionised layers and this method is used for communication over long distances.

There is always a day-to-day variation and it must be remembered that the same set of circumstances do not occur from day to day and of course this is more pronounced from month to month and each year of what is known as the 11-year cycle. Coupled with all this is a geographical variation. See Fig. 1 for an indication of seasonal variation.

Prediction charts are prepared for estimated propagation at the middle of each month, and are never the same for two successive months. You only need to take a transparent piece of paper and plot the same chart for different months on it to verify this.

Propagation may involve one or more reflections from the ionosphere. There is, however, a limit to the length of a single hop set by the height of the reflecting layer. It is generally assumed when predicting the Maximum Usable Frequency (m.u.f.) that the signal will travel by the minimum number of hops, preferably by the F2 layer. For circuits longer than 3,000 km., it is considered that only the state of the ionosphere at the points of reflection nearest each



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terminal will affect the m.u.f. for the circuit, and for circuits under 3,000 Kc. the state of the ionosphere at the midpoint of the circuit will determine the m.u.f.

MAXIMUM USABLE FREQUENCY

In order that signals transmitted from one place should be received at another, it is necessary for the frequency of the signal to be below the maximum usable frequency for that path. The m.u.f. depends on the state of the ionosphere at the point of reflection and the angle at which the signal strikes the layer—plus other factors to be discussed later. As mentioned earlier, circumstances change daily, so therefore the m.u.f. will vary. When your frequency exceeds the m.u.f., ionisation at the point of reflection is not strong enough to bend your signal back again.

One often hears the comment "I was talking to so and so. He had a beautiful signal and next time I went over he was gone." The answer is simple. You were operating right below the m.u.f. existing at the time and whilst you were transmitting, the m.u.f. dropped slightly and the band closed between you. You can also get mixed up in an ionospheric disturbance and this will be discussed later. Remember you get "beautiful" signals right on the m.u.f., but they may not be beat for long. Frequencies just above the m.u.f. will not be received in normal propagation, whilst those below are received, and it is therefore possible for one end of our bands to be open and the other closed to the same DX.

The m.u.f. for a circuit does not depend on the type of equipment or antenna used, but on the ionosphere. All the r.f. and gain from your antenna you can muster will not enable you to communicate by F2 layer reflection above the m.u.f.

ABSORPTION LIMITING FREQUENCY

In addition to the m.u.f., there is a lower limit to the frequencies which can be used for communication between two points. This is due to absorption of the signal in the D region of the ionosphere (see Fig. 1) which is the lowest region of pronounced ionisation and extends 30 to 50 miles above the earth and exists mainly in the daylight hours. This is known as the Absorption Limiting Frequency (a.l.f.). Whilst there are large variations in the m.u.f. during a sunspot cycle, there is not a great deal of change in the a.l.f., and for this reason it has not been worth showing the a.l.f. in the various charts which will follow in this discussion.

When say 28 and 14 Mc. are open at the same time, it will take considerably more power on 14 Mc. to equal the strength of the 28 Mc. signal. Since the m.u.f. is the highest frequency that can be used for F2 layer reflection, absorption is at its maximum at this point. The level of absorption varies greatly throughout the days, seasons of the year and geographically. Absorption is more intense in equatorial regions where the sun is more directly overhead than in temperate latitudes and is generally greater during summer than winter. The a.l.f. can also cause opposite ends of a band to be open or

closed, but as signals are not as strong and noise level is much higher, it is more difficult to detect than the m.u.f.

OPTIMUM WORKING FREQUENCY

It has been observed that the F2 layer is normally within 15% of its calculated height. To enable commercial circuits to maintain good continuous communication they keep away from the m.u.f. and so keep out of strife. They normally use what is known as the Optimum Working Frequency (o.w.f.) and this is assessed as 10% below the m.u.f.

Take a look at the charts in general in recent issues of "A.R." and you will see that in nearly every case the a.l.f. at some time of the day exceeds 14 Mc. The chart to Rio de Janeiro often is an interesting one from an Amateur point of view. When the a.l.f. exceeds 14 Mc., frequencies of 14 Mc. and below are completely absorbed and reference again to the charts will show a number of instances where the a.l.f. exceeds the m.u.f. When we have this situation, no communication is possible by F layer reflection.

Entrants in R.D. Contests well remember how 14 and 21 Mc. open unexpectedly and erratically for short or long periods to an adjoining State. This is not caused by F layer reflection, but some kind of anomalous propagation, e.g. E layer or Sporadic E. This type of thing cannot be predicted, not at the present state of the art.

SOLAR RADIATION

In dealing with radio propagation, it is probably not fully realised just what an important part the earth's magnetic field and the sun play. There is evidence that the earth's magnetic field exerts considerable influence on the degree of ionisation of the F2 layer. The electrical intensity of the ionosphere depends on the ultra violet radiation from the sun. The greater the amount of radiation from the sun, the more electrified the ionosphere becomes and the better h.f. propagation exists. If radiation is low, then propagation is poor. This radiation from the sun produces ionisation of the various layers shown in Fig. 1.

For short and even medium circuits, it may be possible to have propagation from the E and F1 layers during the day, but at night and for longer distances, only the F2 layer is satisfactory and consequently this is the layer influencing our DX working.

Intense ultra violet radiation from the sun causes an increase in ionisation of the D region and can cause a complete absorption of radio waves in the sunlit hemisphere of the earth. Absorption decreases as the frequencies increase but it also increases as the path of the signal nears the point immediately below the sun and this effect controls the a.l.f.

During daylight, radio signals may be disrupted from place to place by several methods. Frequencies transmitted by ionospheric reflection usually lie in the h.f. band, but under certain conditions the m.f. and v.h.f. bands can be affected.

The greater the intensity of the reflecting layer ionisation, the more signal is reflected. The D layer is only

slightly ionised and reaches its maximum at noon. The frequencies of 1.8 Mc. and 3.5 Mc. are completely absorbed by this layer. Only high angle radiation is reflected by the E layer except during low sunspot activity. The smaller or lower the angle of radiation, the less bending is required to bring the signal back to earth and also the lower the angle, the greater the distance between the point where the wave leaves and returns to earth. The less bending required, the less the absorption.

The aim of all Amateurs should be to get the strongest signal to its intended destination and therefore every available means, within the regulations of course, should be used to achieve that end. The greatest barrier to this is absorption, disregarding of course the point made previously, of keeping below the m.u.f.

One aspect some Amateurs are faced with is a poor location, and for this, predictions cannot be blamed, because they can hear their next neighbour working the DX according to prediction. The prediction charts can do little for the Amateur in a poor location other than make him frustrated.

For short range work, it is important that the angle of radiation is high.

The lowest useful layer for distances up to 750 miles is the E layer. It is mainly a daytime layer and practically disappears at night, therefore DX for v.h.f. operators is very poor at night. This layer is not considered satisfactory for multiple hop working. Bear in mind the angle of radiation for the E layer must always be higher than for the F layer. The height of the E layer remains practically constant throughout the day.

PREDICTION CHARTS

The prediction charts you see in "A.R." are prepared on the basis of an angle of radiation of 5°, and a distance of 2,000 miles, so if your radiation angle is high, you should not expect your DX working to be in accord with the predictions. The higher your angle of radiation, the further away from the predicted DX you will find your working. The charts are for a terminal located between Canberra and Sydney, so Amateurs in other States will find them not completely true for their own activities as latitude and longitude each combine to change the o.w.f. The charts are reasonably accurate for a QTH within 3° of latitude and longitude of the terminals listed.

There is probably criticism of the Magazine Committee for printing only charts centred on Canberra.

I.P.S. do not produce DX charts for terminals other than Canberra, Melbourne and Perth. I have checked the charts to the same DX point from these three terminals and in some instances there is very little difference in the m.u.f. I will give a couple of charts on this aspect later on and much as I would wish, I am unable to help the VK4 boys here because I have not the material available to make any comparison.

Even the beam boys have not the ultimate in radiation patterns. As well as being able to switch your fixed beam or turn the rotary, there is a need to be able to move it vertically to "zero"



DF-2

FOSTER DYNAMIC MICROPHONES FOR HAND-DESK USE

SPECIFICATIONS:

Output Impedance	...	50 ohms or 50K ohms
Effective output level	... -55 db. [0 db. -	(one) 1V. Microbar]
Frequency response	...	200 to 10,000 c.p.s.

OMNI-DIRECTIONAL DYNAMIC:

SIZE: 3" x 2-1/8" x 1".
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Switch: on-off.
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in on the angle the signal is arriving. My own observations have been, with distinct propagation, a dipole can receive just as well as a beam; because the signals do not come from the same angle as under normal propagation.

V.H.F. DX-ING

Tropospheric propagation does not affect h.f. very much, but its effect can be noticed at times on 28 Mc., but more generally on 50 and 144 Mc. The best bet for v.h.f. DXers to know when this type of propagation is a possibility is to have a contact at the Met. Bureau as it is influenced by changes in temperature and humidity.

There was extreme consternation during the war on a number of radar stations located in the tropical areas when pictures, completely strange to what were expected, suddenly appeared on the screen. All sorts of major enemy activity was expected, but it was eventually traced to anomalous propagation and signals were being reflected back from land hundreds of miles outside the normal range of the radar station. This is tropical only, but v.h.f. DX.

During last sunspot maximum, predictions by F2 layer reflection reached 45 Mc. in some directions in VK, but generally v.h.f. DX is hit or miss because so many factors influence these bands. 144 Mc. is not generally affected by ionospheric reflection but is more pronounced than on 50 Mc. and range is reduced. Ionospheric bending is more prevalent on 220 Mc. and higher, but range is further reduced.

Sporadic E often assists in obtaining longer v.h.f. DX working up to 144 Mc., but it normally only occurs in summer.

V.h.f. DX working is also possible during ionospheric disturbances, the signals being affected by the intense ionisation that occurs, so you v.h.f. operators, if you know there is an ionospheric disturbance on, keep a close watch on your bands for DX.

During 1947, Radio Amateurs using 50 Mc. discovered what is now known as **Trans-equatorial Scatter**. By working across the magnetic equator, it was discovered this band opened up between North/South when propagation by normal means was considered impossible. JA/VK QSOs were possible by this method. This type of propagation normally occurs early in the evening.

THE CRITICAL FREQUENCY

What is the critical frequency? It is obtained by transmitting short bursts or pulses of radio energy directly upwards and having an echo returned. The I.P.S. have a special type of antenna to do this. From the result we learn two things—the height of the reflecting layer and the frequency at which there is no reflection, that is, the signal passes right through and there is no reflection. This frequency is known as the "critical" frequency and is obtained by varying the transmitted signal across a range of frequencies until one is no longer returned. Critical frequencies are highest during sunspot maximum and lowest during sunspot minimum. Except in winter, the F1 critical frequency varies much the same as the E layer. In summer a heating effect takes place in the F2 layer and F2 critical frequencies at night are much higher than in winter,

hence the reason for better night DX in summer than in winter. F2 critical frequencies are generally higher in the Asiatic and Australian regions than in Europe and the Western Hemisphere.

IONISATION

During daylight hours, when the ultra violet radiation is strongest, the ionosphere is strongly ionised. During the hours of darkness, very little radiation reaches the ionosphere from the sun. Ionisation of the D, E and F1 layers therefore increases from a very low level at sunrise—reaches maximum at noon—then decreases towards sunset. Ionisation of the F2 layer rises steeply at sunrise. This can be observed in many charts where you see the rapid rise in the m.u.f. curve round 2000 g.m.t. Maximum ionisation occurs after the sun has reached overhead and then decreases at a slower rate. After dark, F1 and F2 layers combine.

During winter daylight hours the sun is 3 million miles closer to the earth and causes a high critical frequency. During winter hours of darkness, the critical frequency falls to a low value. There is a nutshell is why 14 Mc. and above are dead, or at any rate poor, for DX at night during winter, dependent on the state of the sunspot cycle.

The intensity of ionisation varies with latitude, being considerably greater in the equatorial regions where the sun is more directly overhead. At high latitudes the changes in the structure of the ionised layers is quite rapid when compared with the behaviour at lower latitudes. This is particularly noticeable near the Auroral Zone.

There is direct relationship between what is called the "smoothed" sunspot number and the increases in ultra violet energy.

During low sunspot activity, reflection is confined to 14 Mc. or even lower. Ionisation not only bends a wave, it causes energy to be absorbed and each bending causes more absorption of the r.f. energy. The higher the frequency, the less absorption. Whilst absorption takes place in each layer, it occurs greatest in the D layer. As sunspot activity falls, so the absorption becomes less.

Sporadic ionisation may affect the propagation of signals either favourably or unfavourably but in any case it produces the predictability of circuits and therefore the reliability of circuits.

It may reflect frequencies which would not normally be so (14 and 21 Mc. in R.D. Contest). However, it also may blanket transmissions. Its characteristics change quickly and from day to day.

Remember in multiple hop working, your signals have also to be reflected at ground level and salt water, fresh water and varying types of ground all have different effects on bending back your signal in the direction of the ionosphere. The best spot to have your antenna installed is over salt water. Confirmation of this is the results obtained by W1BB in his 1.75 Mc. work.

Ionospheric propagation is not possible on frequencies below the a.f. You can use the ground wave for a certain distance depending on the frequency you are using, but in general the higher the frequency, the less the

ground wave coverage. It is in this type of work power can be of great assistance.

DISRUPTION OF COMMUNICATIONS

Let us have a look at some of the things that can upset our planning to operate a certain band into a particular DX spot on a regular sked, even though the charts give the "green light".

Propagation can be disrupted by a number of causes. One is **Daylight Fadeouts** which in the polar region become polar blackouts. These daylight fadeouts cannot as yet be accurately forecast but are most likely to occur when suitable conditions, which may or may not include sunspot activity, are present on the sun. During a daylight fadeout, the higher frequencies are less affected—v.h.f. not at all. Your signal can be affected if it passes through daylight during any part of its journey to your DX station, even though both are in darkness.

A regular DXer can often observe the commencement of a daylight fadeout because of a hissing sound which commences on the band and slowly rises in intensity and then slowly dissipates. One of the most severe I ever heard occurred early in 1966 whilst listening on 7 Mc. and it was interesting to hear the comments of various stations interstate who were operating on the band at the time whose QSOs were interrupted.

These effects do not always show up on I.P.S. scientific data which is received from various observing stations throughout the world, and this occurred with this one.

Magnetic storms are another source of trouble. These set up intense current systems in the auroral zone by the arrival of particles from the sun. The drifts of ionisation caused by the interaction of the earth's magnetic field with these currents are observed as the ionospheric disturbance. These disturbances disrupt our bands by causing drastic increases in absorption and a severe decrease in the ionosphere's ability to reflect signals.

In the weekly ionospheric broadcast over VK2WI, mention is often made of solar flares. These are tremendous explosions which take place on the surface of the sun. They occur suddenly and emit vast quantities of ultra-violet energy, x-rays and cosmic radiation. Much of this abnormally high radiation reaches the D band of the ionosphere where it forms a blanket of intense absorption resulting in a fade-out and at times a complete radio blackout.

If the bombardment of the ionosphere is intense enough, its effect on both the magnetic fields of the earth and the stability of the ionosphere result in magnetic storms. During ionospheric storms, the critical frequency may be reduced by as much as 50% below normal.

Although primarily affecting the F layer, the severe storms can affect the E layer, so v.h.f. propagation is not free from this problem. A severe magnetic storm has been known to disrupt cable communications. There is much less trouble from ionospheric storms during low sunspot periods.

It has been pointed out that the disturbance is usually more severe in higher latitudes with maximum in the auroral zone, and these as a rule are the first areas affected. From Eastern Australia, the main circuit paths near these zones are to South Africa, South America and the long path to London. It is also found that paths to Eastern U.S.A., Canada and the short path to London are affected to a greater extent and at an earlier stage in the disturbance than other paths in lower latitudes or across the equator.

One interesting phenomenon which active VK DXers have observed is that DX conditions become excellent just before an ionospheric disturbance commences. By this I mean that signals are much stronger than they have been days prior to this and there have been a great deal more signals coming through than we have been hearing. The following day to this observation, the bands are worse than for many days. I have discussed this with a member of I.P.S. but no reason can be advanced why this should occur. It happens too many times to be just coincidental and I am convinced it does occur.

Too much reliance should not be placed in the WWV/WWVH broadcasts in respect of propagation advice. The information they broadcast is for conditions in the North Atlantic-North Pacific area and do not necessarily apply to VK unless there is a major upset in the ionosphere. The information obtained by I.P.S. is generally by scientific instrumentation and very often happenings which are observed by actual "on the air" operation do not show up in the information they receive from world observation reports.

Radio Amateurs can be of assistance to I.P.S. by supplying any information on abnormal behaviour of our bands, but it is essential the information be supplied as soon as practicable after the occurrence. Delay of some days defeats the object of the exercise.

PRESENTATION OF PREDICTIONS

There are probably different thoughts amongst Amateurs on how they would prefer the predictions to be presented in "A.R."

I have seen different methods of presentation in overseas magazines and, in my humble opinion, the present method used in "A.R." is the easier to read and allow you to do any transposition you may wish. One can readily see how close the m.u.f. and a.f.f. curves are to the Amateur bands and arrange his operating accordingly, and of course the S.W.l. who wishes to listen to overseas broadcasts can pick the most suitable frequency for his station.

READING THE CHARTS

In compiling the prediction charts, a distance of 3,000 Km. is used as this is considered to be the maximum distance for single hop transmission using the F2 layer. As mentioned previously, we have the day-to-day variation in the F2 layer, but the day-to-day variation in the lower layers is small and usually ignored in predictions. At the present time, I.P.S. produce 44 charts based on Canberra, 33 on Melbourne and 19 on

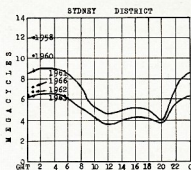


Fig 2

Perth, amongst many others, and these are being readily added to. Some of the Canberra charts have been provided at my request, the most important being the long and short paths to West Africa which have been included in the VK2 Bulletin for some years.

Do not get the idea that only long range communication is affected by the varying periods of the sunspot cycle. Fig. 2 shows a chart for the Sydney district for June and pin points the m.u.f. for six different years, not successively, but covers the last part of the old cycle and up to 1966. Two complete curves are shown but the pin point is for 0100 GMT, which is the time of the VK2WI broadcast. The minimum can be clearly seen as occurring in 1963. Much against my better judgment, the chart is prepared in E.S.T., but the point can be stressed better that way.

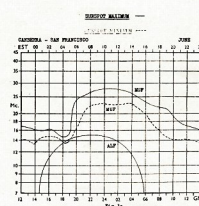


Fig 3a

At 11 a.m. in 1958 during the period of maximum sunspot activity, the m.u.f. for the Sydney district was 12 Mc., in 1960 10.5 Mc., and then in the 1963 minimum period it dropped to 6.2 Mc.

An examination of this chart will, in my opinion, very conclusively show we are in for a low sunspot maximum this cycle. How do I arrive at this conclusion you ask? From 1961 to 1963—a 2-year period—we dropped 2.6 Mc. in m.u.f. From 1963 to 1966—a 3-year period—we have only increased by 0.8 Mc. and you must remember the rise of cycle is always faster than the fall.

This propagation of course meant during the period of low sunspot activity VK2WI broadcasts from Dural were

inaudible in the Sydney area and many places beyond, but excellent signals were received on 3.5 Mc. In 1958 the reverse was the case except that 3.5 Mc. was audible but a poor signal and down in the noise level. One point to note is how the variation in the m.u.f. curves shown is much less during the hours of darkness, and very pronounced round sunrise.

Having earlier discussed propagation and all the things that can upset your operating, don't lose heart, because those conditions are not frequent, but they must always be considered. So let us now proceed with how to interpret the different DX charts under normal conditions.

Figs. 3a and 3b give the varying situation for Canberra to San Francisco for June and December during sunspot maximum and minimum, the dotted curve being the minimum part of the cycle. Notice that in June the curve during daytime is reasonably flat but in December this is not the case. Note also the curve does not peak at the same time of the day.

In December, the highest m.u.f. for the minimum sunspot period (dotted line) reaches 26 Mc. round 2345 GMT, whilst the peak m.u.f. for the maximum period reaches 32 Mc. round 0200 GMT. The a.f.f. exceeds 14 Mc. from 1830-0200 GMT in June and in December it happens 2130-0400 GMT.

Figs. 4a and 4b are charts for Canberra to London via long path for the same period and you will see an enormous difference in the curves for June and December both in the m.u.f. peaks and their times and the big difference in the a.f.f. curve for the different parts

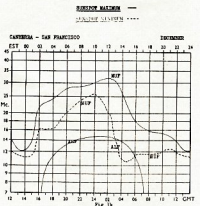


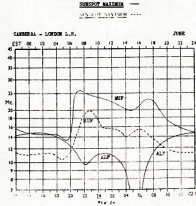
Fig 3b

of the year for maximum sunspot cycle period. The a.f.f. for the December maximum period exceeds 14 Mc. from 1400-0330 GMT.

The December chart for the minimum cycle period (dotted line) is well worth a fuller examination. I will start off by saying that 21 Mc. would be open from 0900 to 1200 GMT; 14 Mc. 0900 to 1400 GMT, and 7 Mc. 0800 to 0920 GMT. How do I arrive at this?

Well I have previously said the a.f.f. exceeded 14 Mc. between 1400 and 0330 GMT. If you recall, it was previously pointed out that where the a.f.f. exceeds a particular frequency, no communication is possible on that frequency or below it by F layer reflection.

tion. You may say, "But the m.u.f. exceeds 14 Mc. with a peak at 1800 GMT." You are correct, but as the a.l.f. exceeds 14 Mc. at that time, the m.u.f. is useless—but, you could use 15 Mc. at 1800 GMT for 2 hours and 16 Mc. for probably 15 minutes whilst the curve is round 16 Mc. The a.l.f. falls below 14 Mc. at 0330 GMT so you may think that 14 Mc. would then become open as the absorption is down. This is not so as the m.u.f. at 0330 GMT is only just above 12 Mc. and therefore 14 Mc. is still unusable and the m.u.f. curve does not reach 14 Mc. until



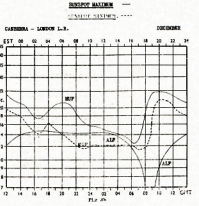
almost 0900 GMT and it rises rapidly to reach 22 Mc. at 1000 GMT, so you now have 14 and 21 Mc. open up rapidly, and the m.u.f. then slowly falls to 21 Mc. at 1200 GMT. It reaches just above 14 Mc. at 1630 GMT but the a.l.f. exceeds 14 Mc. from 1400 GMT. The a.l.f. continues to fall to below 7 Mc. at 0800 GMT and returns to 7 Mc. at 0930 GMT, allowing a long path opening on 7 Mc. between 0800-0930 GMT.

By looking closely at the chart, still Fig. 4b, you should be able to readily see that at 0900 GMT it is possible to use 7, 14 and 21 Mc. (use the dotted m.u.f. curve), but for only a brief period of 15 minutes. The reason for the very brief 3-band opening is that 21 Mc. does not open until just after 0900 GMT and 7 Mc. closes at 0915, 14 Mc. will close at 1400 GMT.

On the June chart, Fig. 4a, and using the sunspot minimum (dotted curve), 7 Mc. will be open 0430-0615 GMT because the a.l.f. falls below 7 Mc. for that period and this is when the phone boys, disregarding the gentlemen's agreement, are most unpopular with the c.w. boys, because these openings do occur whilst many think 7 Mc. DX does not appear until towards sundown. 14 Mc. opens 2045-0730 GMT with a doubtful period round 0400 GMT when the m.u.f. drops to 14 Mc. and then rises again. The closest we get to a 21 Mc. opening is at 2230 GMT when the m.u.f. is just below 20 Mc.

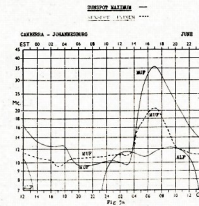
A further indication of June and December variation is shown in Figs. 5a and 5b. Note the enormous difference in m.u.f. at 0700 GMT in June (Fig. 5a) for sunspot maximum and minimum periods. The m.u.f. for the minimum period (dotted line) is 21 Mc. whilst

the maximum period the m.u.f. reached 36 Mc. Another interesting point is that at the period 1900 to almost 0400 GMT, the m.u.f. curve for sunspot minimum is higher than the m.u.f. for the sunspot maximum. During minimum period we get a variation of m.u.f. in the 24 hours of 9.5 Mc. at 1700 GMT to 21 Mc. at 0700 GMT—11.5 Mc., whilst for the maximum period for the 24 hours we have a variation from 9.5 Mc. at 2000 GMT to 36 Mc. at 0700 GMT—26.5 Mc. which is almost two and a half times as much as the minimum.



Looking at the chart for 7 Mc. working, we find the minimum (dotted line) period gives a 7 Mc. opening from 1330-2315 GMT and believe it or not, this is longer than 14 Mc. will be open. 14 Mc. is only open from 0400-0900 GMT. 21 Mc. may or may not open as the peak only just reaches 21 Mc. at 0700 GMT. Whether we get an opening and for how long will depend on the behaviour of the critical frequency. At no time in June does the a.l.f. reach 14 Mc. yet in December, Fig. 5b, it exceeds 14 Mc. from 0100-1145 GMT.

If you like to take a piece of transparent paper and lay it over the various charts, Figs. 3, 4 and 5, you will get some idea of what variations occur in direction, part of the cycle and time of the year. All right, let us now return to Fig. 4b.



Due to ionospheric variations, let us use a hypothetical set of circumstances in which the a.l.f. does not reach 14 Mc. but remains just below. This now makes a difference to our 14 Mc. opening during the minimum (dotted line) period. 14 Mc. now will be open from 0900 GMT to 2000 with a doubtful period at 1630 GMT caused by that dip in the m.u.f. to 14 Mc.

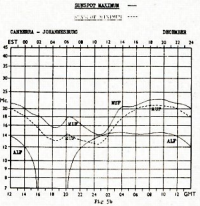
For the sunspot maximum (full line) period, the drop below 14 Mc. in the a.l.f. makes an enormous difference to 14 Mc., which now becomes open from 0715-0415 GMT, the period from 0415-0715 when the band is out is when the m.u.f. drops below 14 Mc. Let us carry the make believe a little further and assume the m.u.f. is above predictions and exceeds 14 Mc. from 0415 to 0715 GMT. So we have the a.l.f. sitting below 14 Mc. and the m.u.f. above for a full 24-hour period, and this means of course a continuous long path opening on 14 Mc. to London. But for part of that 24 hours, high power and high gain beaming would be necessary due to the a.l.f. being close to 14 Mc.

EFFECT OF LATITUDE AND LONGITUDE

With the use of Fig. 6, I hope to make the point clearer where I said that the m.u.f. varies greatly for varying latitude and longitude. Four different locations or terminals are shown, one each to North, South, East and West of Canberra. They are for the same period, and for the purpose of the exercise, they are being treated as the same distance from the Canberra terminal.

The period is for December 1965 and the four terminals are Lae, Macquarie Island, Auckland, and Perth.

Looking at the North/South chart, the a.l.f. rises above 7 Mc. at the same time, 0600 EST, and closes at 1800 EST but notice how the absorption is much greater on the Northern path than on the Southern. Why? Because the sun is more overhead in the North. You could work 14 Mc. to Macquarie Island (dotted line) for almost 24 hours a day because the a.l.f. does not reach 14 Mc. and the m.u.f. only falls below 14 Mc. between 0200-0430 EST. The path to Lae is an entirely different story. The a.l.f. exceeds 14 Mc. (no opening) between 0930-1400 EST. Whilst the absorption is at its peak on this circuit,



the m.u.f. reaches 31 Mc., which is 12 Mc. higher than the m.u.f. to Macquarie Island. So you can readily see the enormous variation in daytime working for your North/South path.

Now what is taking place on the East/West path? The first thing that should be apparent is the time zone difference between the two terminals, which reading from the chart is 3 hours approximately. One could probably be excused for expecting the a.l.f. curve, allowing for the time difference, to be the same for these two terminals, but as you can see, the a.l.f. for Auckland (dotted line) does not exceed 11 Mc.,

the m.u.f. approximately 1 Mc. higher. With this chart you will see the a.l.f. does not drop below 10 Mc. at any time, therefore there will be no 7 Mc. opening. 14 Mc. would be open for 24 hours except for a brief period 1600-1700 GMT, when the a.l.f. and m.u.f. sit around 14 Mc. There would be two brief openings on 21 Mc. from 0001 GMT to 0400 GMT and a touch and go at 1100 GMT.

Look at the enormous transformation that has occurred for six months either side of December 1964. Here we will be very lucky if we get a 14 Mc. opening at all, because the m.u.f. just

PREDICTIONS FOR OTHER PARTS OF AUSTRALIA

Although it is not very successful to show in a small scale drawing, with Fig. 8, I have attempted to show the variations that do occur in propagation for Canberra and Perth to the same terminal, and have used Johannesburg, short route to London, and San Francisco for which there is only one chart.

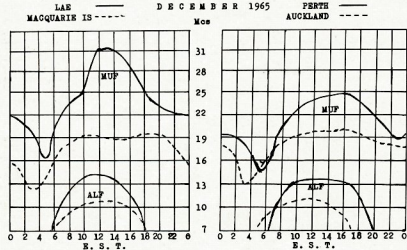


Fig. 6

whereas the one for Perth reaches 14 Mc. and of course closes 14 Mc. to Perth during that period. The m.u.f. follows a similar pattern to the a.l.f., that for Perth peaking at almost 25 Mc., whilst Auckland (dotted line) reaches 20 Mc. Another interesting point to observe is that the m.u.f. curve for Auckland is reasonably flat during the day but the one for Perth is not.

It should be fairly obvious by now that to maintain a circuit to each of these points from Canberra on the same frequency at the same time would be extremely difficult. Remember that for a satisfactory five-way QSO each must be able to hear the other and this would be almost impossible when you consider that Lae is twice as far from Macquarie Island as from Canberra and skip will be altogether different. You can give yourself an exercise and work out a time for working the other four from Canberra. My choice would be 14 Mc. at 0600 EST, hoping that the m.u.f. to Perth would not be below predictions.

RIO DE JANEIRO

Earlier I mentioned that the charts to Rio de Janeiro were often interesting and Fig. 7 shows three charts for different periods and they can be applied to other years as will be mentioned shortly.

Fig. 7a gives the chart for December 1964 and checking the charts for the same time of 1963 and 1965, I find the curve follows a similar pattern with

reached 14 Mc. at 2200 GMT. In reverse we have two 7 Mc. openings, one from 0600-1100 GMT and also 1500-1730 GMT. The a.l.f. falls below 7 Mc. at these times.

For the same period in June 1963 and 1966, the only variation is that the peak exceeds 14 Mc. and reaches 17 Mc. for three hours and we get a little longer opening on 7 Mc.

In Fig. 7c you see how variable the curve becomes in the Equinox. We lose the smooth flowing curve of the December and June period and for September 1966, there is a brief 21 Mc. opening at 2200-2300 GMT and only one 7 Mc. opening which occurs at 0700-1000 GMT. No band is open between 1200-2100 GMT.

For September 1965, the m.u.f. was 4 Mc. lower and in September 1964, 5 Mc. lower, so you see in the Equinox you get more m.u.f. variation for this circuit.

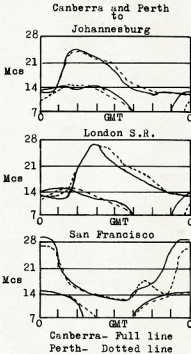


Fig. 8

As I mentioned earlier, there is not such an enormous difference between the terminals each side of the Australian continent. To fully show this aspect, it would take many diagrams covering circuits to various DX points and different times of the year, cycle, etc. But I think you should be able to see that the VK6 boys can use the charts shown in "AR." with some degree of certainty. The diagrams shown are all for October 1966, Canberra being the full line and Perth the dotted.

Whilst predictions for Melbourne show a very similar pattern to those for Canberra, in practice I find at times there is quite a difference in the DX working between Sydney and Melbourne.

(Continued on Page 12)

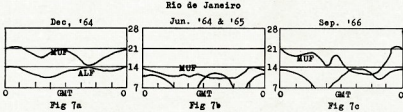


Fig 7a

Fig 7b

Fig 7c

5 WATTS S.S.B.—HOME-BREW WITHOUT HANGOVER

GREG JOHNSTON, B.Sc.

HAVING somewhat of an oversupply of twin triodes, five only crystals on 5327 Kc. and in anticipation of the day when I am able to convince the powers that be that I am fit to take out a call sign of my own, the "idle" (?) hands were bent towards a first rig which as the caption shows turned out to be "the thing." PanSy won't refer to me in any shape or form now!

However, levity aside, this exciter, which was first air-tested by local sidebander VK7KC, was so simple to get going with a minimum of complications in the around the filter circuitry especially, that pen was put to paper.

It is emphasised that my test equipment set-up comprises only a g.d.o., and for this project a vintage general coverage receiver capable of tuning the desired v.f.o. ranges. On air comments heard from time to time tend to indicate that many an OM has not "got with the strength" because he doubts his own ability to home-brew s.s.b. equipment and lacks the db's to buy commercial gear. Let's face it, if an s.w.l. like me can build, anyone with a ticket can.

THE FILTER

As can be seen, the filter consists of four crystals in a cascaded half lattice arrangement with a bifilar wound toroid in parallel across the two sections. Cathode follower audio input to the filter removes the need for the complications of impedance matching input inductances and makes a most worthwhile saving in terms of time

and trouble while no great circuit losses are introduced. The high impedance coupling into the 6BA6 grid after the filter, although theoretically wrong, produces the desired results.

The filter was constructed on two pieces of matrix board, approximately 2" x 2" and the crystal sockets fabricated by sandwiching pins from an ancient p.t.f.e. octal socket between the two pieces of matrix. The holes already in the matrix board are very close to the spacing necessary for FT243 crystals. Normal FT243 crystal sockets were not used due to the complications they often introduce through stray capacitance, which is minimised in the suggested arrangement.

The next step was to find something to support the toroid and trimmer—namely, the former (type 4453) was used here. These i.f. have a very nice trimmer of about 25 pF, built into them as well as a set of four pillars of just the right height supporting them. The pillars and trimmer were retained and the rest of the i.f. scrapped. The pillars fit very neatly down the outside of the filter crystals when they are mounted on the matrix board, leaving adequate clearance over the top of the crystals to mount the toroid and trimmer.

As mentioned earlier, a set of five crystals nominally on 5327 Kc. were obtained ex surplus. Two of these were on the same frequency exactly, two others were within a couple of hundred cycles of each other about 1 Kc. higher, while the fifth was somewhere between. This last one was retained for use as a carrier crystal while the two higher ones were etched by Lee VK7KC to 2 Kc. exactly above the low frequency pair. Lee provided the gear to measure the frequency exactly and also did the measuring.

After resonating the toroid roughly to frequency (filter) with a link off the g.d.o., the filter pass band was adjusted by feeding the output from a converter through the filter into a BC454 i.f. and adjusting the filter trimmer for best sounding passband on an 80 metre s.s.b. signal. This point also coincided with best passband for s.s.b. transmission. Note, no sweep generators and such used!

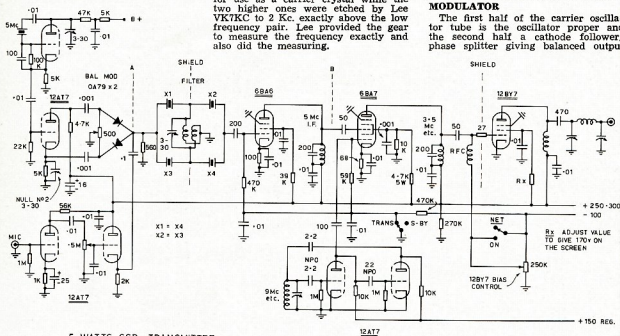
Adjustment of the carrier crystal was made by trial and error loading of the carrier crystal with pencil lead to a point just below the low frequency filter crystals. The appropriate point will be noted by monitoring the balanced modulator output in the general coverage receiver for best audio quality. I took the carrier crystal frequency too low twice before striking the correct position, but it is no trouble to scrub the pencil lead off the crystal with an old toothbrush.

SHIELDING

Under chassis shields were used in two places on the 6 x 4 inch exciter sub-chassis. One shield runs across the centre of the filter and shields the audio and carrier oscillator sections from the 6BA6, 6BA7 and filter output, while the other shield runs between the 12BY7 and the remainder of the circuit. Carrier suppression was not degraded by leaving the filter unshielded above chassis and no other peculiar effects were noted.

CARRIER OSCILLATOR, BALANCED MODULATOR

The first half of the carrier oscillator tube is the oscillator proper and the second half a cathode follower/phase splitter giving balanced output



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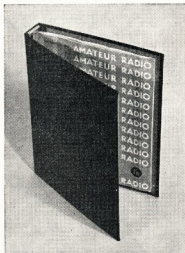
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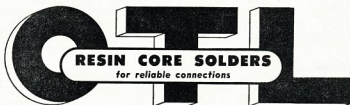
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into the balanced modulator. C1 in the plate circuit of the oscillator section can be a 3-30 pF. Philips trimmer which will allow some small adjustment of carrier crystal frequency to get it right "on the nose". The Philips trimmer in the cathode circuit of the phase splitter section is adjusted for correct phase relation which will show as a distinct extra null in carrier after the balanced modulator.

The carrier balance pot. should be around 500 ohms w.w., else the carrier null adjust will be too critical. The diodes used here were OA79s matched with the multimeter for approximately equal forward and back resistance. In practice, any similar low-signal diodes will be quite adequate.

AUDIO SECTION

Three types of tube having identical base connections have been tried here and all give good results. The types tried were 12AU7, 12AV7 (E180CC) and 12AT7. With the high output microphone used the 12AU7 gave adequate drive and the 12AT7 more than adequate. The 12AV7 gave slightly less drive than the 12AT7.

12BY7 P.A.

As shown in the circuit the design is as simple as possible. In this arrangement the tube is adjusted to run in Class AB1 with a resting plate current of 5 mA. with the bias pot. In my own exciter, —4 volts bias limits the plate current to this value when the carrier is nulled out and no audio drive applied. With tone input the plate current runs to 15 mA. with 170 volts on the screen and 300 on the plate.

With these voltages the average plate dissipation of the 12BY7 is just exceeded at 15 mA. plate current—the tube is not reached on voice peaks.

The pi-network output enables the exciter to be used barefoot as a QRP rig or an exciter for a high power final.

V.F.O.

As shown, the v.f.o. is a Franklin which produces quite adequate conversion voltages from a 150 volt regulated supply with a very high order of stability and it possesses an added advantage in that a two-terminal coil is used. All condensers shown are NPO ceramic types. Once again 12AU7, 12AV7 and 12AT7 may be used interchangeably with virtually identical results.

T/R SWITCHING AND KEYING

This is very simply accomplished by grid block biasing of the 6BA6 i.f. and 6BA7 mixer, the —4 volts bias on the 12BY7 being sufficient to cut the tube off when drive is absent. A separate netting switch which applies—100 volts to the 12BY7 will prevent this tube from conducting when the main function switch is in the transmit position—the signal from the 6BA7 being at an adequate level for netting purposes. C.w. operation is possible by inserting carrier and grid block keying the exciter—the keying circuit being placed in parallel with the T/R function switch.

TRANSCIVER OPERATION

This has not yet been attempted, but is contemplated. The low noise front end described in an earlier article could be fed into the transmitter at point A and 5 Mc. output taken off at point B and fed into a further 5 Mc. i.f. stage. With small modification the carrier oscillator could be used as the b.f.o. for the receiver section and the v.f.o. for the conversion oscillator.

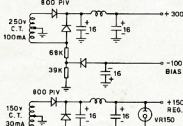
GENERAL

With the carrier crystal on the low frequency side of the filter the correct sideband is automatically selected if the v.f.o. is on the following frequencies:—

	V.f.o.	Sideband
80 Metres	8.8 Mc.	Lower
40 "	12.2 Mc.	Lower
20 "	8.8 Mc.	Upper
15 "	15.8 Mc.	Upper
10 "	22.8 Mc.	Upper

The r.f. chokes shown are 2.5 mH. receiver types and they are quite adequate in the positions shown—none of those distressing clouds of smoke having appeared as yet.

It was found very helpful to test each section of the exciter as it was wired. In my own case all wiring up to the balanced modulator output was completed and the quality, carrier null, etc., checked out on the receiver at 5 Mc. before proceeding. Successive test points thereafter were after the filter, 6BA6 plate, etc. It will be found that the single 5 Mc. i.f. winding in the 6BA6 plate is very sharp with output dropping very sharply either side of resonance—a slug tuned former (I used 24 turns on 1/4 inch) is a must here.



"5 WATTS SSB" POWER SUPPLY

Alignment of the completed unit is quite simple with a dummy load such as a standard torch globe connected to the 12BY7 tank, insert carrier and tune the 6BA7 and 12BY7 plate coils for maximum plate current on the 12BY7. With the voltages mentioned and with the grid bias to the 12BY7 set at approximately —4 volts, the plate current at 3.5 Mc. should be around 12 mA. The peak should be sharp and at this stage the dummy load lamp almost burning out.

On nulling the carrier, the dummy load will extinguish before the maximum plate current null is observed so the carrier balance is set to a point where minimum plate current (about 5 mA.) is flowing without audio drive. Having reached this point, final carrier nulling is best performed by switching to the net position and monitoring the

precise point of best carrier suppression on the receiver as it will be found that the plate current meter lacks adequate sensitivity for final adjustment.

At this stage things should be ready for final testing. Switch to transmit, make a noise like "one, two, three" or similar with the stage before the mlke and see if the plate meter kicks and the p-lamp dummy load lights up on modulation. If this happens OK, then zero beat what carrier remains (with r.f. and i.f. gains backed off) on the receiver set to s.s.b. receive condition—you should be able to resolve the duck talk easily, if you can't, and the speech sounds distorted, then increase the 12BY7 operating bias gradually until a point of clear intelligibility and easy resolution is reached. Note the standing plate current at this stage as this is the appropriate value.

One note of warning, if you run the v.f.o. and 12BY7 screen off the same regulated supply, make sure it is a very stiff one, as even slight v.f.o. pulling on modulation will reduce the modulation to unintelligibility.

So far reports from on-air tests conducted by Lee VK7KC have been quite favourable, although the 2 Kc. filter bandpass may be too narrow for the hi-fi enthusiasts. However, it is hoped that my novice efforts will demonstrate the results which can be achieved with some assistance, a g.d.o., multi-meter, five crystals, limited brain band-pass and a bit of spare time as well as provide the small push needed to get some of the a.m. thinkers started on s.s.b. Meanwhile VK7KC gets a spare exciter and I get back to the c.w. tapes.



MORE YO AWARDS

YO-25M—WORKED MERIDIAN 25

There are needed contacts with Amateur stations of the countries located on the 25th meridian:
Europe: LA, OH, UF, UQ, UR, UC, UB, VO, LV, SV.
Africa: SA, ST, TT, ST, TL, S, 92, 93, 94, 95, 96, 97, 98, 99, 1, 2, 3, 4, 5, 6.

Class III., 6 contacts with 6 countries; Class II., 12 with 12; Class I., 18 with 18. One contact with each country. A YO contact is obligatory in all cases. Valid contacts after 1/1/60.

YO-40 BY 40—WORKED 40 YO ON 40 MX

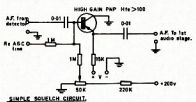
There are needed 40 two-way contacts with 40 YO stations on 40 mx band (7 Mc.) after 1/1/60. A YO station may be worked but once.

YO-43F—WORKED PARALLEL 43

There are needed contacts with Amateur stations of the countries located on the 43th parallel:
N.A.: W7, W6, W9, W8, VE3, W1, VE1, FP8, E, YU, YV, YB, UA, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 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13, 14,

SIMPLE SQUELCH CIRCUIT

This circuit should be of interest to those who want to listen on a net frequency without the annoyance of a continuous background hiss. Only one transistor and a few resistors and capacitors are used, enabling this circuit to be fitted to an existing receiver without occupying too much space.



As it stands, the circuit is most suitable for incorporating in a valve receiver. The voltage V can be obtained from the cathode of the audio output tube, or from a voltage divider off the h.t. line supplying between 5 and 15 volts.

Under no signal conditions, there is little or no voltage on the a.g.c. line and a reverse bias is obtained from the 50K potentiometer to just cut the transistor off. When a signal is present, the voltage on the a.g.c. line provides forward bias to switch the transistor on and allow the signal through the transistor. The common collector configuration provides approximately unity voltage gain and a high input impedance. Some distortion is introduced by the circuit, but this can be minimised by a very high gain transistor and a voltage V of 12 to 15v. (or higher, depending on the voltage rating of the transistor). This will allow the transistor to switch on at a low signal strength and allow a wide excursion of the transistor operating point without bottoming at high signal strength.

—Reprinted from West Australian V.H.F. Group News Bulletin, August 1969.

☆ Propagation of Amateur Signals (Continued from Page 8)

SUMMARY

Those who have shown any great interest in what has been written will probably say, "But what about this, that or something else?" I can only reiterate what I said in the beginning, that this is an enormous subject, about which there is still much to be learned, and which I have left unsaid.

If there is something any Amateur would like dealt with or amplified further, let the Magazine Committee know and I am sure they would pass the request on and I will see what can be done. If it is beyond my limited knowledge, I know that the Ionospheric Prediction Service in Sydney would help where possible.

ACKNOWLEDGMENTS
The Sunspot Story printed in "CQ".
The Ionospheric Prediction Service, Sydney.

AMATEUR FREQUENCIES: USE THEM OR LOSE THEM!

DO YOU QSL?

Or are you one of those who like to receive better than to give? A QSL, in our opinion, is a Statute of Ham Radio. It stands for a contact you have made with a new or old friend, who may live near or far. A QSL may represent a contact that you may make just once and never make again because of death, sickness or just QRM and band conditions. Some may have their QSLs on a wall of their shack, while others prefer to keep them in files, or in a scrap book. It is something to look at in the years to come, as perhaps a remembrance of some message you have handed to make a few hearts beat nearer to each other, or a contact you have spent many hours at trying to make points, or a QSO perhaps in the wee hours of the morn when you could not sleep. QSLs represent a hobby that gives young and old, all races and creeds, many hours of enjoyment. A hobby that is not just for the able bodied, but the blind and crippled as well.

Remember the new Hams just getting on the air for the first time as are pleased to receive those cards now as you were. A promise that they will have one in the next mail just to receive one yourself is a flaw in your character.

Let us all try to live up to the proverb, "Do unto others as you would have them do unto you."

Don't send your cards down just in a parcel all mixed up, and say to yourself someone else can do the sorting. Just think before you parcel them up by doing the following: Put your QSL sticker on the back of the card, then the Call Sign to whom you are sending it too, then the most important part is to put your cards in "alphabetical order". By doing this you will be helping those people who do the work for you. Also another most important point is to print the Call Sign as some hand writing is hard to decipher.

- Points to remember are:—
- (1) Put your sticker on the card.
 - (2) Put the Call Sign on the back to whom it has to be sent to.
 - (3) Sort into country order.
 - (4) Alphabetical order.
 - (5) Print or write clearly.
- (With acknowledgment to S.A.R.L. (Durban) "CQ News Letter".)

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE			
VK3AHO	310/322	VK4HR	361/277
VK3MS	309/330	VK3JZ	333/258
VK3AB	300/314	VK3TL	241/245
VK6MK	286/313	VK2ADE	232/237
VK8RU	286/318	VK2AK	221/225
VK4FJ	273/280	VK2APK	217/220
New Members:			
VK5GX	101/101	VK6XX	110/110
VK4PX	108/108		
Amendments:			
VK3SM	117/119	VK2AGH	108/118
C.W.			
VK3KB	317/340	VK2AGH	278/289
VK2ADE	291/313	VK3AHQ	278/288
VK3CX	291/312	VK3NC	268/286
VK3QL	288/308	VK3JC	261/269
VK4FJ	286/308	VK8RU	251/272
VK2EO	278/300	VK3XB	248/261
Amendments:			
VK3YL	238/256	VK3KS	203/209
VK3RJ	231/244		
OPEN			
VK2ADE	305/328	VK4HR	278/301
VK2AGH	305/323	VK2ACX	276/300
VK8RU	301/324	VK3ARK	270/278
VK6MK	301/323	VK3JC	267/287
VK4FJ	282/314	VK3JA	265/283
VK2VN	282/300	VK3TL	260/284
New Member:			
VK4CK	183/104		
Amendments:			
VK2SG	161/185	VK4PX	143/148

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FOR ACCURACY, STABILITY, ACTIVITY AND OUTPUT

Our Crystals cover all types and frequencies in common use and include overtone, plated and vacuum mounted. Holders include the following: DC11, FT243, HC-6U, CRA, B7G, Octal, HC-18U:

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ALSO AMATEUR TYPE CRYSTALS—3.5 And 7 Mc. BAND.

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With the co-operation of our overseas associates our crystal manufacturing methods are the latest.



AUSTRALIAN DX CENTURY CLUB AWARD

OBJECTS

- 1.1 This Award was created in order to stimulate interest in working DX in Australia and to give successful applicants some tangible recognition of their achievements.
- 1.2 This Award, to be known as the "DX Century Club" Award, will be issued to any Australian Amateur who satisfies the following conditions.
- 1.3 A certificate of the Award will be issued to the applicants who show proof of having contacted one hundred countries and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

- 2.1 Verifications are required from one hundred different countries as shown in the Official Countries List.
- 2.2 The Official Countries List will be published annually in "Amateur Radio" and will be amended from time to time as required. Should a country be deleted from the Countries List at any time, members and intending members will be credited with such country if the date of contact was before such deletion.
- 2.3 The commencing date for the Award is 1st January 1946. All contacts made on or after this date may be included.

OPERATION

- 3.1 Contacts must be made in the H.F. Band (Band 7) which extends from 3 to 30 Mc., but such contacts must only be made in the authorised Amateur Bands in Band 7.

- 3.2 All contacts must be two-way contacts on the same band. Cross band contacts will not be allowed.
- 3.3 Contacts may be made using any authorised type of emission for the band concerned.
- 3.4 Credit may only be claimed for contacts with stations using regularly-assigned Government call signs for the country concerned.
- 3.5 Contacts made with ship or aircraft stations will not be allowed, but land-mobile stations may be claimed provided their specific location at the time of contact is clearly shown on the verification.
- 3.6 All stations must be contacted from the same call area by the applicant, although if the call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.
- 3.7 All contacts must be made when operating in accordance with the Regulations laid down in the "Handbook for the Guidance of Operators of Amateur Wireless Stations" or its successor.

VERIFICATIONS

- 4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.
- 4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

- 4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.
- 4.4 A check list must accompany every application setting out the details for each claimed station in accordance with the details required in Rule 4.3.

APPLICATIONS

- 5.1 Applications for membership shall be addressed to the Federal Awards Manager, Box 2811W, G.P.O., Melbourne, Vic., accompanied by the verifications and the check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.
- 5.2 A nominal charge of 2/6, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.
- 5.3 Successful applicants will be listed periodically in "Amateur Radio". Members of the D.X.C.C. wishing to have their verified totals, over and above the one hundred necessary for membership, listed will notify these totals to the Federal Awards Manager.
- 5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.
- 5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

AUSTRALIAN V.H.F. CENTURY CLUB AWARD

OBJECTS

- 1.1 This Award has been created in order to stimulate interest in the V.H.F. bands in Australia, and to give successful applicants some tangible recognition of their achievements.
- 1.2 This Award, to be known as the "V.H.F. Century Club" Award, will be issued to any Australian Amateur who satisfies the following conditions.
- 1.3 Certificates of the Award will be issued to the applicants who show proof of having made one hundred contacts on the V.H.F. bands, and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

- 2.1 Contacts must be made in the V.H.F. Band 8 (Band 5) which extends from 30 to 300 Mc., but such contacts must only be made in the authorised Amateur Bands in Band 8.
- 2.2 In the case of the authorised bands between 30 and 100 Mc., verifications are required from one hundred different stations at least seventy of which must be Australian. The Amateur Bands 50 to 54 Mc. and 58 to 60 Mc. will be counted as one band for the purposes of the Award.
- 2.3 In the case of the authorised Amateur Band between 100 to 200 Mc. and any authorised band between 200 to 300 Mc., verifications from one hundred different stations for each band is required.
- 2.4 It is possible under these rules for one applicant to receive three certificates, one for each of the authorised Amateur Bands nominated in Rules 2.2 and 2.3.
- 2.5 The commencing date for the Award is 1st June, 1946. All contacts made on or after this date may be included.

OPERATION

- 3.1 All contacts must be two-way contacts on the same band, and cross band contacts will not be allowed.
- 3.2 Contacts may be made using any authorised type of emission for the band concerned.
- 3.3 Fixed stations may contact portable/mobile stations and vice versa, but portable/mobile station applicants must make their contacts from within the same call area.
- 3.4 Applicants, when operating either portable/mobile or fixed, may contact the same station licensee, but may not include both contacts for the same type of endorsement.
- 3.5 Applicants may only count one contact for a station worked as a limited licensee with a Z call sign who is subsequently contacted as a full A.O.C.P. holder.
- 3.6 All stations must be contacted from the same call area by the applicant, although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.
- 3.7 All contacts must be made when operating in accordance with the Regulations laid down in the "Handbook for the Guidance of Operators of Amateur Wireless Stations" or its successor.

VERIFICATIONS

- 4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.
- 4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.
- 4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

- 4.4 A check list must accompany every application setting out the following details:-
 - 4.4.1 Applicant's name and call sign, and whether a member of the W.I.A. or not.
 - 4.4.2 Band for which application is made, and whether special endorsement is involved.
 - 4.4.3 Where applicable, the date of change of call sign and previous call sign.
 - 4.4.4 Details of each contact as required by Rule 4.3.
 - 4.4.5 The applicant's location at the time of each contact if portable/mobile operation is involved.
 - 4.4.6 Any relevant details of any contact about which some doubt might exist.

APPLICATIONS

- 5.1 Applications for membership shall be addressed to the Federal Awards Manager, Box 2811W, G.P.O., Melbourne, Vic., accompanied by the verifications and the check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.
- 5.2 A nominal charge of 2/6, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.
- 5.3 Successful applicants will be listed periodically in "Amateur Radio". Members of the V.H.F.C.C. wishing to have their verified totals, over and above the one hundred necessary for membership, listed will notify these totals to the Federal Awards Manager.
- 5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.
- 5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

AUSTRALIAN D.X.C.C. COUNTRIES LIST

	Phone	C.W.		Phone	C.W.
AC3	Sikkim	FR7	.....	Tromelin Is.
AC4	Tibet	FS7	.....	Saint Martin
AC5	Bhutan	FU8, YJ1, 8	.....	New Hebrides
AP	East Pakistan	FW8	.....	Wallis & Futuna Is.
AP	West Pakistan	FY7	.....	Fr. Guiana & Inini
BV (C3)	Formosa	G	.....	England
BY (C)	China	GC	.....	Guernsey and Deps.
CE	Chile	GC	.....	Jersey I.
CE9, KC4, LU-Z, VK0, VP8, ZL5	etc., Antarctica	GD	.....	Isle of Man
CE0A	Easter I.	GI	.....	Northern Ireland
CE0X	St. Felix I.	GM	.....	Scotland
CE0Z	J. Fernandez Arch.	GW	.....	Wales
CM, CO	Cuba	HA	.....	Hungary
CN2, 8, 9	Morocco	HB	.....	Switzerland
CP	Bolivia	HC	.....	Ecuador
CR3	Portuguese Guinea	HC8G	.....	Galapagos Is.
CR4	Cape Verde Is.	HB0 (HE)	.....	Liechtenstein
CR5	Principe, Sao Thome	HH	.....	Haiti
CR6	Angola	HI	.....	Dominican Rep.
CR7	Mozambique	HK, 5J	.....	Colombia
CR8, 10	Port. Timor	HK0	.....	Arch. of San Andres and Providencia
CR9	Macao	HK0	.....	Bajo Nuevo
CT1	Portugal	HK0	.....	Malpelo Is.
CT2	Azores	HL, HM	.....	Korea
CT3	Madeira Is.	HP	.....	Panama
CX	Uruguay	HR	.....	Honduras
DJ, DL, DM	Germany	HS	.....	Thailand
DU	Philippine Is.	HV	.....	Vatican
EA	Spain	II, IT1	.....	Italy
EA6	Balearic Is.	IS1	.....	Sardinia
EA8	Canary Is.	JA, KA	.....	Japan
EA9	Ifni	JT1	.....	Mongolia
EA9	Rio de Oro	JY	.....	Jordan
EA9	Spanish Morocco	K, W	.....	U.S.A.
EA0	Spanish Guinea	KA0, KG6I	.....	Bonin & Volcano Is.
EI	Rep. of Ireland	KB6	.....	Baker, Howland and Am. Phoenix I. (inc. Canton I.)
EL	Liberia	KC4	.....	Navassa I.
EP, EQ	Iran	KC6	.....	Eastern Caroline Is.
ET2, 3, 9E	Ethiopia	KC6	.....	Western Caroline Is.
F	France	KG4	.....	Guantanamo Bay
FB8	A'dam & St. Paul Is.	KG6	.....	Guam
FB8	Crozet Is.	KG6	.....	Marcus I.
FB8	Kerguelen Is.	KG6	.....	(Rota, Tinian, Saipan, etc.)
FC	Corsica		.....	Mariana Is.
FG7	Guadeloupe	KH6	.....	Hawaiian Is.
FH8	Comoro Is.	KH6	.....	Kure I.
FK8	New Caledonia	KJ6	.....	Johnston I.
FL8	Fr. Somaliland	KL7	.....	Alaska
FM7	Martinique	KM6	.....	Midway Is.
FO8	Clipperton I.	KP4	.....	Puerto Rico
FO8	Fr. Oceania	KP6	.....	Palmyra Group, Jarvis I.
FO8	Maria Theresa	KR6	.....	Ryukyu Is.
FP8	St. Pierre & Miq. Is.	KS4B	.....	Ser'na Bank & Roncad Cay
FR7 (from 25/6/60)	Glorioso I.	KS4	.....	Swan Is.
FR7 (from 25/6/60)	Juan de Nova and Europa Is.	KS6	.....	American Samoa
FR7	Reunion I.	KV4	.....	Virgin Is.

	Phone	C.W.		Phone	C.W.
KW6	Wake I.		UG8	Armenia	
KX6	Marshall Is.		UH8	Turkoman	
KZ5	Canal Zone		UI8	Uzbek	
LA	Bouvet I.		UJ8	Tadzhik	
LA, JX	Jan Mayen		UL7	Kazakh	
LA	Norway		UM8	Kirghiz	
LA, JW	Svalbard		UO5	Moldavia	
LU	Argentina		UP2	Lithuania	
LX	Luxembourg		UQ2	Latvia	
LZ	Bulgaria		UR2	Estonia	
MP4B	Bahrein		VE, VO	Canada	
MP4Q	Qatar		VK	Australia	
MP4D, T	Trucial Oman		VK2	Lord Howe Is.	
OA	Peru		VK4	Willis Is.	
OD5	Lebanon		VK9	Christmas I.	
OE	Austria		VK9, ZC3	Cocos Is.	
OH	Finland		VK9	Nauru I.	
OH0	Aland Is.		VK9	Norfolk I.	
OK	Czechoslovakia		VK9	Papua Terr.	
ON4	Belgium		VK9	Terr. of New Guinea	
OX, KG1, XP	Greenland		VK0	Heard I.	
OY	Faeroes		VK0	Macquarie I.	
OZ	Denmark		VP1	British Honduras	
PA0, PI1	Netherlands		VP2	Anguilla	
PJ	Neth. West Indies		VP2	Antigua, Barbuda	
PJ2M	Sint Maarten		VP2	Br. Virgin Is.	
PX	Andorra		VP2	Dominica	
PY	Brazil		VP2	Grenada & Deps.	
PY0	Fernando de Noronha		VP2	Montserrat	
PY0	St. Peter & Paul Rocks		VP2	St. Kitts, Nevis	
PY0	Trindade & Martin Vaz Is.		VP2	St. Lucia	
PZ1	Netherlands Guiana		VP2	St. Vincent & Deps.	
SL, SM	Sweden		VP3	(see 8R)	
SP	Poland		VP4	Trinidad & Tobago	
ST2	Sudan		VP5	Turks & Caicos Is.	
SU	Egypt		VP6	Barbados	
SV	Crete		VP7	Bahama Is.	
SV	Dodecanese		VP8	Falkland Is.	
SV	Greece		VP8, LU-Z	South Georgia	
TA	Turkey		VP8, LU-Z	South Orkney Is.	
TF	Iceland		VP8, LU-Z	South Sandwich Is.	
TG	Guatemala		VP8, LU-Z, CE9	Sth. Shet. Is.	
TI	Costa Rica		VP9	Bermuda Is.	
TI9	Cocos I.		VQ8	Agalega & St. Brandon	
TJ (FE8)	Cameroon Rep.		VQ8	Chagos Is.	
TL8 (from 13/8/60)	Cent. Afric. R.		VQ8	Mauritius	
TN8 (from 15/8/60)	Congo Rep.		VQ8	Rodriguez I.	
TR8 (from 17/8/60)	Gabon Rep.		VQ8	Aldabra Is.	
TS (3V8)	Tunisia		VQ9D (from 10/11/65)	Desroches	
TT8 (from 11/8/60)	Chad Rep.		VQ9F (fr. 10/11/65)	Farquhar Is.	
TU2 (fr. 7/8/60)	Ivory Coast Rep.		VQ9	Seychelles	
TY2 (fr. 1/8/60)	Dahomey Rep.		VR1 (includ. Canton Is.)	British Phoenix Is.	
TZ2 (from 20/8/60)	Mali Rep.		VR1 Gilbert & Ellice Is., Ocean Is.		
UA, UV, UW1-6, UN1	Eur. R.S.F.S.R.		VR2	Fiji Is.	
UA1	Franz Josef Land		VR3	Fanning & Christmas Is.	
UA2	Kaliningrad Region		VR4	Solomon Is.	
UA, UW9, 0	Asiatic R.S.F.S.R.		VR5	Tonga Is.	
UB5, UT5, UY5	Ukraine		VR6	Pitcairn I.	
UC2	White Russian S.S.R.		VS5	Brunei	
UD6	Azerbaijan		VS6	Hong Kong	
UF6	Georgia				

[illegible]

SIDE BAND

Sub-Editor: PHIL WILLIAMS, VK5NN

This month I was to have launched into a discussion on input circuits for grounded-grid linear amplifiers, but the Magazine Committee has been overworking and underpaying its drawing-office staff so another topic has to be found for the holiday issue of the magazine. This same staff, we are told, has been doing a wonderful job on other single sideband articles, so we must be grateful for the work they have been doing towards furthering the art.

There is a question I am asked very frequently by the a.m. operators who feel they are missing out on contacts and would like to wet their feet gradually on sideband:

WHY NOT DOUBLE SIDEBAND?

It certainly looks a lot easier than single sideband. Yes, it does look easier to get going than single sideband, but there are still quite a lot of tricks to the trade, and one must not forget that the high-level double sideband transmitter must be very carefully adjusted and operated if it is not to emit unwanted products of modulation, which can be emitted at quite a high level when modulation of a high-level stage is carried out.

With screen modulated high-level balanced modulators such as, for example, a pair of 6DQ6 valves—a popular final—care must be taken to limit the modulation so that the output is linear and does not spread the width of the signal. The signal width is already double the audio frequency, as with a.m., and it is undesirable to make it any broader.

For this reason it is recommended that the double sideband should be generated at low level in a conservatively operated balanced modulator and then amplified by linear amplifiers in the same manner as in a single sideband transmitter. The best d.s.b. transmitters I have heard on the air have been of this type, without doubt, and of course, the linear amplifier section of the transmitter is already there and waiting to form part of the s.s.b. transmitter when you finally get around to doing the job properly.

Precautions which must be observed with all d.s.b. or s.s.b. transmitters are, the shielding to prevent feedback from the high power stages to the audio input and oscillator/doubler stages, careful arrangement of power supplies and regulation thereof, to prevent oscillator pulling. Of course oscillator stability is even more important, I consider, with d.s.b. than with s.s.b., as you will be operating oftener than not, in single sideband nets. Many d.s.b. stations "slide" into contacts with s.s.b. nets without being noticed in the net, especially if all members of the net are using selective s.s.b. receivers.

If the signal is stable and there is no pulling or feedback, and the modulation level is not pushed—and the audio frequency response is limited, especially the low frequency response—then most s.s.b. receivers will not know the difference and nobody in the net will even comment. But so often the d.s.b. man has not paid attention to all of these matters, since his transmitter has been rushed up in an attempt to get on "sideband" quickly, and he then gets bad reports and goes around saying rude things about those holier-than-thou sidebanders who couldn't build anything anyway, and have more money than ability, and won't talk to an honest experimenter who hasn't got pots of money. He is going straight back to a.m. or even c.w. and will never join that mob of stuck-up "voice-teasers" who never knew how to rag-chew or brass pound as in the good old days—and so on. We have all heard the story over and over again. Just one more Amateur is not giving himself a chance to enjoy sideband operating properly, by not being prepared to do the job properly from the start.

The main advantages of d.s.b. are the elimination of the carrier, elimination of high-powered modulators and the heating of the shack which these cause. In mobile work the elimination of these and their drain on the battery may be well worth while. The simplicity of a mobile d.s.b. rig is quite a point, too.

There are relatively few operators, however, who stay with d.s.b. for long, and I consider that the receiving situation is partly responsible for this. A single sideband receiver is relatively tolerant of single sideband signals, as far as frequency of the inserted carrier is concerned. The signal is still intelligible from about -100 c.p.s. to +300 c.p.s., even though the person may not be recognisable since the pitch of all voice frequencies will be changed by that amount and will not, therefore, be in correct harmonic relationship to reproduce the voice with fidelity. Music sounds horrible under such conditions—ever tried it?

For a d.s.b. signal, with both sidebands being received, the inserted carrier must be set precisely between the two sidebands and remain in place if the signal is to be satisfactorily demodulated. Synchronous detectors may be used for demodulation of d.s.b. transmissions and excellent quality reception is possible—much better than a.m., in fact. If all our broadcast stations used this method of transmission, though, everybody would need to purchase synchronous receivers and this would add to the cost of millions of receivers—so the b.c. station transmits the carrier for a very good reason.

A count of the number of synchronous detectors in Amateur receivers in the world would probably not exceed the fingers on one hand, so most of our d.s.b. men must work in s.s.b. nets in the sections of the bands frequented by s.s.b. stations, but should he be like our friend above, who gets the cold shoulder for poor transmissions, he then seeks refuge with the a.m. boys. These chaps do not have very stable receivers with stable v.f.o.s or b.f.o.s—nor do they have single sideband selectivity so they will not be bothered receiving these funny "double duck-talk" men whose signals are so hard to resolve. Why, the s.s.b. fellows are hard enough!—by the time you've cut back the r.f. gain or pulled off the antenna, advanced the a.f. gain, cut out the noise limiter, waited for the b.f.o. to stop drifting, and then tried to zero beat the old a.m. transmitter to the b.f.o.—the game's not worth the trouble. So our poor d.s.b. man goes back to c.w. or the potting shed.

And then there was that "beaut" QSO he was in last week with several good mannered s.s.b. men, when a very ill-mannered "oaf" broke in and told him that he may be OK on the present net, but would he please remove that other up-side-down sideband which he had deposited on top of their net, if he away which had been going happily for two hours before he came along with that heap of double sideband junk.

Thus go the trials and tribulations of the double sidebander, who is operating a perfectly clean and legitimate transmitter within his bands and in accordance with the terms of his licence (except that his input might even be 151 watts peak on the odd occasion).

So if you are thinking of going d.s.b. just because it looks easy and as a prelude to going s.s.b., just to get the feel of operating without a carrier, please don't let me discourage you, but be warned by the things I have just told you. Don't let rude comments deter or upset you. You'll need a hide like the rhino, to blast your way through the comments and remain on the bands whatever they say about you. These have been the experiences of a number of ex-double sidebanders, who decided to go s.s.b. and leave this batch of troubles behind them, only to have to battle through a new lot of s.s.b. troubles.

Don't forget though, that life is one long series of battles, but take my tip and remember that since life is short, avoid as many unnecessary battles as possible and go "single sideband" while you are young—so that you may enjoy it in your old age.

Finally, I trust all our sidebanders are enjoying their summer holidays, that the DX is good for 1967, and may your sunspots increase as the new year rolls along.

73 for now, Phil VK5NN.





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The SIDAC is a five-layer semiconductor device (NPNPN) having two terminals, greatly simplifying a.c. control circuits. Being bi-directional, one SIDAC can replace two SCR's in conventional control systems. In addition, blocking voltages are less temperature sensitive in the SIDAC and since there is no reverse direction, voltage transients do not injure the device. Current surges also are less damaging than those encountered in SCR's as the current is not initially confined to a small area near a gate. The SIDAC is cheaper than a comparable SCR's. Firing the SIDAC is simplicity itself. Either a parallel or series circuit may be used and a specially developed pulse diode is available with suitable pulse transformer.

Type K5B20: Normal a.c. (r.m.s.) Circuit Voltage, 240 r.m.s., Current capacity 5 amps.

\$3.45 + S.T. 12½%

Pulse Diode, Type K2C **78c** plus S.T. 12½%
Pulse Transformer **\$1.20** plus S.T. 12½%
Please add packing and post, 10c set.

NOTE: A Circuit is available for making a 1,000 watt Light Dimmer using K5B20, K2C, Pulse Transformer and a few Resistors and Condensers. Write or call for a copy.

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Heat Sink Adaptors to suit, **25c** plus S.T. 12½%.

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IN3193: 750 mA. at 200 p.i.v. **40c** " " "

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25c each + 25% S.T. plus pack and post 5c.

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Double wound. 15 volts at 500 mA.

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2, 5, 10, 25 uF. 12 v.w.

2, 5, 10, 25 uF. 25 v.w.

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SERIES PHASED ARRAY FOR 14 Mc.

Editor "A.R.," Dear Sir,

In the October 1966 issue of "A.R." there appears on page 4 an article by Wal Salmon, VK2SA, entitled "Series Phased Array for 14 Mc." Whilst I am delighted to see that at least one fellow Ham has managed to devise an antenna with which he seems pleased, as a result of reading my article in "A.R." in February 1959, I would like to point out that the title given to his article is obviously incorrect and misleading.

Sure VK2SA's antenna is a phased array possessing end fire properties, but is by no means a series phased array.

The series phased array as described in "A.R." (Feb. '59) and by other sources has folded half wave elements, spaced quarter wave, connected in series with the feed line and one another.

The gain obtainable from say a 2, 4, or more element series phased array would be practically the same as for any other 2, 4, or more plain dipole, end fire array with the same element spacing and phase relationships. But the big advantage of the series phased array is its less critical tuning and feeding, and its wider band property. It is usually only necessary to calculate the necessary dimensions, make it up, then poke it up in the air.

From remarks passed by VK2SA, I quote, "An unknown question raised in VK3ACM's article centres around the detuning effects when the antenna is pieced together and raised." I would suggest he re-reads said article, as this question was never raised.

The question I did raise, and in practice is not really relevant, was regarding the detuning effects brought about by the spacing of the two conductors comprising each folded element. Not the detuning effects between individual folded elements with various spacings. These, of course, are fixed at quarter wave. The reason for the query was that in the series phased array, as in the case of a folded dipole, we are told that the spacing between the two conductors comprising the folded element, should be negligible or small.

Naturally one assumes this means small as compared with wavelength at which they operate, but here I shall ask a silly question. How small is small?

VK2SA also stated in his article that the series phased array had not been successfully adapted for Amateur work, due to feed and phasing difficulties. This, as I have already pointed out, is not so. Feeding and phasing is so easy. The only point to remember is that the array radiates toward the feed point, not away from it.

Perhaps one reason why it has not gained much popularity, especially with the city dweller, is its small gain. A four-element array having about 6 db. gain over a dipole, whilst for a 10 db. gain an array of about three wavelengths is necessary.

Gains higher than these can be obtained with 3 or 4 element yagis but of course at a price—matching difficulties, critical tuning and narrow band width.

One point that may be worth mentioning is that for a maximum back to front ratio, an even number of elements, i.e. 2, 4, 6, 8, etc., should be used, as in a backward direction the radiation between pairs is cancelled.

—Col. A. MacKenzie, VK3ACM.
[Suggest readers interested also read an article by Len Jackson.—Ed.]

PADT50 TRANSISTORS

Equipment Exchange Bulletin,
P.O. Box 177, Sandy Bay, Tas.

Editor "A.R.," Dear Sir,

We have received several requests for information about the supply and characteristics of the PADT50 transistor used in the transmitter described in the September 1966 issue of "A.R." (with important note of corrections in the October issue). I have done some research on this subject and your readers may be interested.

The characteristics of the PADT50 (made by Amperex) are given in the 1967 edition of the Techpre Transistor Specifications and Substitution Handbook, namely, germanium, PNP, power type, $V_{BE} = 70v$, $P_c = 16.5w$, ($25^\circ C$. case temperature), $I_c = 0.75a$. (abs. max.), $f_r = 60$ (corresponding to $h_{re} = 6$ at $10 Mc.$).

A reasonable replacement or substitute might be the 2N2991, whose characteristics have been measured as follows: NPN, silicon, power type, $V_{BE} = 100v$. (at $100 \mu A$), $P_c = 15w$. (at $100^\circ C$. case temperature), $I_{cmax} = 200 C$. max.), $I_c = 1a$. (abs. max.), $h_{re} = 20-40$ (at $500 mA$, d.c.), $h_{fe} = 4-6$ (at $10 Mc.$). These characteristics are not significantly different from those listed in the abovementioned Handbook.

It is a relatively minor matter to arrange connections for the NPN configuration of the 2N2991 (compared to the PNP PADT50), but some note should be taken that the 2N2991 is silicon, not germanium. The reverse characteristic of the silicon junction is appreciably more sensitive to voltage overload than is that of germanium. Consequently, silicon transistors will be less tolerant of transient overvoltages. Therefore they should have a higher voltage breakdown rating as margin of safety. And the amplifiers in which they are installed should be well designed to avoid overloads—and this includes parasitic oscillations! (Avoid parasitic r.f.c. combinations, keep all leads short, keep output circuits separated from input ones, etc.)

Maximum safe voltage rating is also reduced when collector current is increased and one should not overlook the fact that a collector-modulated stage will need to endure at least double the collector supply voltage. This subject is discussed in the October 1968 issue of the "Equipment Exchange Bulletin," in the Motorola Power Transistor Manual, and in the new Motorola Semiconductor Handbook. In addition, a wide range of articles on the design or construction of transistorised amat-

eur transmitters can be found in the Amateur literature. Some of the more notable recent examples are as follows:

"Break-In" (ZL): Sept., Oct., 1966.

"CQ" (W): Jan. (April), June, 1966.

"CQ's" "Electronics Circuits Handbook" (No. 121), section 3.

Motorola Semiconductor Products Inc.: Technical Application Notes AN-107, AN-112, AN-114, AN-124.

(Probably relevant notes by Fairchild too).

"QST" (W): April 1966.

R.S.G.B. Bulletin (G): March, 1965; March, July, Sept., Oct., Nov., 1966.

"73" (W): April, July, Aug., Sept., 1965; Feb., July, Aug., 1966.

If you are interested in transistorised transmitters, you should make every effort to see this literature, through your library, through your local branch of the W.I.A., or through friends who subscribe. If none of these alternatives are possible, I shall offer here to provide Xerox copies of relevant articles, at cost; if interested, please send a stamped self-addressed envelope for a list of titles, etc.

In 1967 the Equipment Exchange Bulletin will publish a series of constructional articles on this subject as well as some on frequency response characteristics of transistors—if I can find the time and strength to put the articles together.

To return to my original subject, if suitable care is taken to avoid voltage transients, the 2N2991 should prove an adequate substitute for the PADT50, and by January 1967 should be available at a very much lower price from: The Wireless Institute of Australia, Tasmanian Division, P.O. Box 851J, Hobart, Tasmania.

The 2N697 (NPN, Si, 2W, 30V, 100 Mc.) and other similar lower power h.f. transistors should be easy to substitute by the (relatively) inexpensive Fairchild or Anodeon lines available in Australia.

—R. L. Gunther (VK7RG), Editor.

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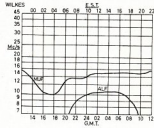
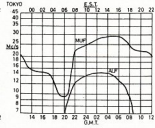
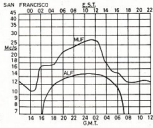
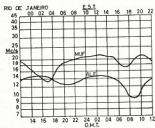
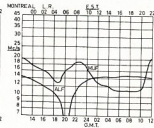
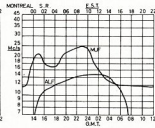
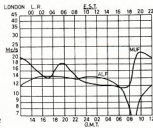
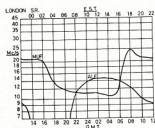
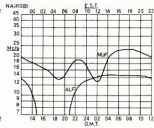
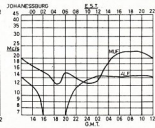
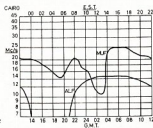
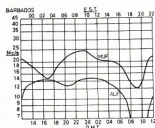
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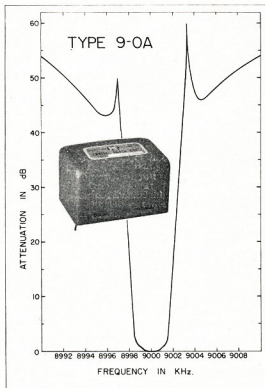
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To satisfy an ever-increasing demand for a filter suitable for s.s.b. transmitting purposes, Pye engineers have developed the Type 9-0A which is now in production at our Crystal Division.

This filter, supplied with two Style "D" carrier frequency crystals and sockets, comprises a package unit. With each unit a typical schematic circuit diagram is supplied.

- Specifications:**
- 6.0 dB Bandwidth: 3 Kc. min.
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PERTH:	151-155 Brisbane Street, Perth	Phone 28-4238
HOBART:	181 Murray Street, Hobart	Phone 3-3797

Correspondence re Federal Comment "On Growing Up"

FIFTY AND OVER

Editor "A.R.", Dear Sir,

Referring to the Federal Secretary's comments "On Growing Up" ("A.R.", November 1966) it is apparent that F.E. has growing pains, but it appears that the direction of growth tends to be out, rather than up. It is regrettable that his theorising does not follow a practical line of thought.

Once again we have the problem, as in other Federal spheres, of a Federal body being carried away by a distorted view of its own importance, and losing sight of the fact that its prime purpose is one of service to its members rather than vice versa.

When the pittance of 30 cents a head is multiplied by some 4000 members, this provides an income of \$1,200 per annum with which F.E. can administer its complex and varied affairs, and it must be borne in mind that this sum is additional to Federal Convention expenses, I.T.U. expenses, and F.E.'s generous contribution to the "Australists" project, all of which are separately borne by the Divisions. Nor is "A.R." a drain on this pittance, being charged to the Divisions each month by VK3.

Whilst I wholeheartedly support the proposal that it is time that the offices of Secretary and Editor cease to be honorary ones, I cannot support any proposal that reverses the present position and gives F.E. control of collection of subscriptions, with return of some miserable pittance to the Divisions.

So far as this Division is concerned, of the present annual subscription of \$4.50 - \$4.41 has been or will be paid this year in the aforementioned Federal matters and "A.R.". This leaves \$1.09 per member to meet the costs of administering the various complex affairs of the Division. As a matter of fact the greater part of this amount is absorbed by meeting-room rentals and monthly magazine, but on the present basis (and any increase in subscriptions would not materially add to the available margin) there is very little more that F.E. can draw out of the Division without forcing us into involuntary liquidation.

Again, whilst the practical benefits of having a paid executive are not denied, the practicability of financing the cost by a substantial increase in subscriptions cannot be overlooked, as the law of diminishing returns would seriously effect the final amount received.

—D. R. Watson, VK4DZ.
Hon. Treas., VK4 Division.

P.S.—The opinions expressed herein do not necessarily coincide with those of VK4 Council or Division, but after all for \$3.41, one should be entitled to make some criticisms!

FEDERAL SECRETARY'S REPLY

Editor "A.R.", Dear Sir,

Mr. Watson kindly forwarded a copy of his letter and I should like to clarify one or two points and expand some others. In passing, apparently other members of the W.I.A. do not appear to be concerned as to how the "see" the Institute—silence could be taken as tacit approval of Editorial Comment!

It would seem that VK4DZ himself has become a victim of the paralysing "parochialism virus"—probably carried up on some of those southerlies that blow from time to time. I often wonder if Divisional Councils have ever taken time to discuss the scope and responsibilities of the Federal body. If they did, there would probably be six different interpretations.

Basking in blissful ignorance then, it is not unnatural for the general attitude of the Divisions to be "we're all right Jack." It must be admitted that part of the blame for this ignorance could be laid at the feet of the Federal body—public relations work has been lacking in continuity over the years and it is this sort of omission that should be corrected by constitutional reform.

Mr. Watson can be forgiven for misconstruing the aspirations of the Federal body: November's Federal Comment is designed to provide more of the very thing that Mr. Watson wants; that is, service to members.

It is not the Federal body that has a distorted vision of its own importance, but the Divisions probably have. Once again we see the parochial outlook as Mr. Watson supports the idea of paid Federal staff yet is not prepared to trust the judgment of the Federal body. Does Mr. Watson imagine that the Institute would be dictatorial? Has he not listened to, and read of, constitutional proposals designed to guard against this sort of thing?

Divisional thought has been too long inbred, and it is my belief that the time is ripe for the whole structure to be examined: The Federal body has a name but nowhere to hang it; Federal Executive is appointed by one Division and ratified by the others; this same Division publishes "A.R."; this same Division also has the highest subscription rate in order to do so.

What a screwy system!

Every member of the Institute should consider his own part and decide whether it is better to perpetuate the narrow self-centred ideologies of Divisional politics, or to be big enough to work towards a financially strong and comprehensive Federal body.

In any organisation both sides must be prepared to give and take. The total amount received by F.E. for routine administrative work is approximately \$1,000 per annum; this would just about pay a part-time typist and petty cash. The amount of \$1,200 stated by VK4DZ is accurate enough but by no means is it anywhere sufficient.

The courses open are clear. (1) You either reread November Federal Comment and accept the principle that a strong stable Federal body is in the best interests of every Australian Amateur even if it means some financial sacrifice; or (2) You reject any semblance of unity, adopt the "U Jack" policy and, as so succinctly put by one Federal Councillor, "drawn in the sewer of" apathy and neglect.

The choice is yours.

—Peter D. Williams, VK3IZ,
Federal Secretary, W.I.A.

Brr-brr, brr-brr, brr-brr. "Oh hullo Bert, is that you? This is VK3ZOM in contact with ... I forgot, we don't need all that rigmarole over the telephone, do we? Yes, Bert, I just rang you up to say that I've got the 150 watt 6 metre rig going ... Yes, I've been using it for the evening ... it's a 167 in the dual. Takes 9 amps. heater current at 5 volts. Yes I did have a bit of trouble getting it going. But it's now normal. The 150 watt 6 metre is jumping round like they should. Modulator? Well I got hold of a 100 watt p.a. system amplifier cheap and I'm using that. You ought to see everything light up when I speak into the microphone.

"Contacts? Well, no, Bert, I haven't actually had any contacts. I don't expect to. You've been listening on 6 metres this evening and haven't heard me? No. I didn't expect you would. No. Bert, I'm crystal locked on the net frequency all right, but that is not the point. You see, it's this t.v.i. business.

"You remember when I was on ten watts I used to get complaints from neighbours with crummy t.v. sets. Well you can't expect the manufacturers to make a decent set with a selective tuner when they can get away with something that's flat for twenty megacycles.

Oh no, Bert, I never had any trouble with the manufacturers. They're very nice people and they agreed that my transmission was quite OK. But of course if enough people complain they must be right even if they're wrong if you see what I mean. It's like Sunday school or defending democracy. So that's why I built this new rig.

Now I know I got the new rig with 150 watts is going to stop t.v.i.? Well of course the new rig by itself wouldn't help but I've always got a selective tuner when the set goes wrong. I found a way of eliminating t.v.i. at any power I thought I might as well let my hair down and see what I can do. I've managed to eliminate t.v.i. It's quite simple really. I'm using a new gadget I've designed myself. I call it an attenuator. No Bert not an attenuator, an attenuator. What on earth is it? Well, you've heard of log periodic antennae? Well this one is made of real logs. That's right, logs. Really. It's a log periodic antenna. It's got a loss of over 100 db in all directions, even in wet weather. Of course in the hot weather when you need the greatest possible loss to prevent t.v.i. the loss practically infinite. It's not a very effective radiator? No that's the whole advantage. No radiation, no t.v.i.

"But actually even with this I was still managing to get out with the 150 watts until I was told to stop. I've got a 75 ohm cable. Why didn't I buy some? Oh no, Bert, you can't buy this kind of cable. When I say 75 ohm cable I mean 75 ohms per foot. That's right. The centre section is resistance wire and it's 75 ohms per foot. Since the log antenna has a s.w.r. of several hundred ... Hold on a minute, Bert, I think I can smell something burning ...

Bert? Hullo Bert. You're still there? Sorry to keep you waiting. No nothing serious. Just the 75 ohm cable caught on fire. I guess I'll have to work out some cooling system. Maybe the water drip out the top ...

"What's the purpose of it all? Well you know what they say. 'Put the game before the money' and that's the reason to have and all that sort of thing. Then one should do anything to prevent the neighbours watching cowboys and gangsters killing each other. It's the only way in the world to help others aren't we? What are the others put in the world for? Well really, Bert, I wouldn't know. But I'm sure the Institute is supposed to help. Anyway, I must rush now, I'll have to get the rig going again for tomorrow night. As soon as I'm working you up and tell you all about it. Cheers."

—Roy Hartkopf.

Fairchild Announces First Australian-Made Zener Diodes

The AN7101/2/3/4/5/ and 6 series of silicon Zener diodes utilise the patented Fairchild "Planar" process to achieve a stable reference voltage with low dynamic resistance, low leakage, low capacitance and high reliability.

Low cost is a major feature of these zeners, with prices as low as 35 cents.

Full data is available by writing to the Marketing Services Department, Fairchild Australia Pty. Ltd., 420 Mt. Dandenong Rd., Croydon, Vic.

Page 22

Sub-Editor: D. GRANTLEY, W1A-1202
P.O. Box 222, Penrith, N.S.W.

The prominent feature on the Amateur bands at the present time is no doubt the vastly improved conditions to be found in the higher frequency spectrum. With 10 mhz so good that it has finally appeared on my rx, and 15 mhz open for periods of 12 to 16 hours, it would appear that we are in for a very good time over the months to come. Thus with these bands at their peak, the old ARV performing moderately well, and Peter Drew and myself in the log, there have been expected some interesting loggings last week-end (Nov. 20/21). This proved to be the case, and some really good DX was logged. Prior to this particular week-end, the loggings of VQ9AA and 9X3SPS had taken the score to the 300 mark. Unfortunately, despite the outstanding conditions over the week-end, Peter and I both let Don Miller's FRT jaunt escape us. This was followed by the rare appearance of CR4 on the bands, when two of them appeared in contact with ZL—unfortunately there was no hope of logging them, thus another country got away. Anyway, if this weekend was a taste of things to come, I guess there will be many busy S.W.I.s over the holiday period.

DIVISIONAL NEWS

The election of officers for the VK3 Group for the next 12 months resulted in the following: President, Harry Roush; Vice-Presidents, Bob Halligan and Michael Krockmal; Secretary, Ian Woodman; Treasurer, Tom Armstrong; QSL Officer, Brian Hannan; Acting Publicity Officer, Harry Roush. The annual Christmas Party was well attended, and the first meeting for 1987 will be Friday, Jan. 27. The VK3 S.W.I. Group congratulates Greg Johnston of VK1 on obtaining the highest score in the Nov. 1986, but VK3 did not miss out entirely, as the Victorian Amateur Listeners' DX Club gained the highest points in the sub-band contest. This has been a year formed within the VK3 listeners group by several keen listeners who concentrate entirely on the DX side of the hobby. The club is in Kew, uses a G5RV antenna and a modified CR100 receiver with space for another six receivers.

The S.W.I. Newsletter, "Zero Beat," is issued twice a month and is attempting to cater for all tastes in short wave listening. Subscription is 60 cents per annum posted, and can be obtained by contacting the Editor, "Zero Beat," Box 52, Caulfield South, E.S.E. Vic. Members are reminded of the constructional night on 10th Feb. and the general meeting on Feb. 24.

VK2 News: I have been criticised for my rare inclusion of notes from this Division and would like to comment here that I rarely get any official information from the meetings. The officials concerned are welcome to send notes to my QTH and such notes will be included, however I do live over 70 miles from the meeting QTH and cannot attend the meetings. So to those who care to criticise, how about either picking up your own pen and sending some notes in, or appoint somebody to do this task. Otherwise my good friends . . . keep quiet.

DX NEWS

Looking for Cook Is? ZK1BW shows up on our occasional e/c and is attempting to set up 3PR working into ZL with a 5 x 9 s.s.b. signal, gives QTH as Apuquindio 2575, Santiago, C.N. and is looking for QSLs to 7X3. The station is into ZL on 2002 on 14, QSL to Box 414, Algeria. FL8HM had a good signal with his 90 watts a few days ago. His name is Hassan and manager is W7LL.

Some up-to-the-minute DX news arrived at the QTH late, however it contains operating times, etc., for stations which most likely will be QRT by January when you read this. The QSL arrangements for the stations concerned are: TAIDS and TA1AV are via 5MKVK, TA2BK, 2FM and 2YC are via DJ2PJ, ON5DLX (K2MYR), UA0YP is via ZL, CT1VA via the Yassine operators SVOWL on Crete (W3CJX) and SVOWU on Rhodes, to Box 66, Rhodes. ZA1BBL is genuine, and has a money permit for November. His QSLs go to Box 702, Tirana. 3WBD has appeared on the bands in the latter stages of November and the general QCNFF says QSL via W3GHI, 7Q7FBD gives the

same QSL manager. 9M2 QSLs should go via the Bkou, Box 777, Kuala Lumpur. T2AAC has been heard at this QTH at 1800z, QSL via K4AMC. PJ2MI has been appearing with a good signal into VK2, QSL via VE3EUU.

BAND CONDITIONS

10 metres has been open on many occasions of late, when KR8s, etc., and Ws have been logged as late as 1100z. Whilst CNA (6800z), SM and OH were heard at 0700z. As well, the band has been open at 2200z during several check periods when Ws and Page stations were logged. On 6 mhz Mac Hilliard reports signals from VK4, DX-wise, 15 mhz is good, and has been checked regularly at 2400z, 2410z, from 1800z to 0300z, and 6800z to 1200z, and there have been signals on all occasions. But the best DX is undoubtedly on 80, particularly in the pre-dawn period when the Middle East stations are being logged quite well on the long path. As well as these, many South Africans and other exotic calls have been noted.

During this period some of the call signs logged were 5Z4IW, 5A3TW, 4X4TU, TR8AG, Q97TC, CN8FF, 9Q5SS, 9Y8AH, 9Q5PS, HK3, C8RAI, T2AAC, EP2RV, 9P2Z, V77NA, 9Q5QC, 9Q5XS, 9Y8AL, VP3GLE, CT3AS, 7Z3AB, CT2YA, CN8VF (via W2GHI).

Down on 40 mhz the commercials and static have played havoc, nevertheless the DX is there, including MP4s on c.w.

AROUND THE SHACKS

Bob Mutton, down there in VK7, has not been doing much of late, however this is understandable for by the time you will be reading this, he will be married. If anybody has the QSL address of 9G1ND and VE3FZ Bob would like it, his address is 24 Springfield Ave., Moonah, Tas., or you may care to pass it on to me instead.

Bob Halligan, L3229, has had QSLs from SW1AZ, VP2ET, VK0RH, GMB8QA and KL-TQX5, as well as hearing three new calls, 9L1HX, PR3CE and VP2KJ. (The latter is on Nevis, and is a certain QSL via the Flatbush Radio Club, Bushyfield Sta., Brooklyn, N.Y., 11228, U.S.A.—L3202).

Warwick L3211 has been spending quite a lot of time between study and his car, thus he has not been inactive. New cards have arrived, these include VP1BR, 9DAAW, YU-2NJP, T12PZ, VK0TO, KC6BW, H1CKT, DL1BK, 942FK, UB5NO, ZC4PC, V56AJ and TG9EP.

Over to VK5 where Ernie Luff has been chasing the DX. He has logged CF7FE, EA3NI, H3KXAL, K2MYR, VE2BU, G3, F1ARCT, ZC4CN, VP2AC, CX3CO, Z560T, T18LH, W5-RBS, UL1HX, OA6HC, FO8AS, FW8RC, 7Q7FH, 944BK, VU2WZ, EP2X, 9P2Z, 9P2Z, 9P2Z, 9P2Z, many others. His latest QSLs to hand are WH1KQ, FK8AB, V56AJ, VK6KK, CN8MT, CN8EB, E18S, GC8ACH, VQ8AR, VP2VU, VP2QR and HZ1AB.

Ian Woodman, L3006, has just acquired a new Lafayette HA-82A f.m. receiver and is busily probing the ether in the 152-174 Mc. region.

L3229's activities have been covered fairly well in these notes, one has not QSLed other than special ones for E.A.R.C. and QRP awards were K16CF and a VE. The latter one is of special interest as it was the second fully completely filled out VE card I have ever received and also for the fact that he replied to my card direct and returned the C.R.C.—an action unprecedented in these circles.

OVERSEAS LISTENERS

This month we would like to greet Hugh Jenkins, a 20-year-old listener from Kincardine in Scotland. Hugh started serious listening several years ago, using a No. 19 set, but recently acquired a Lafayette 44-400 with a second fully completely filled out VE card I have ever received and also for the fact that he replied to my card direct and returned the C.R.C.—an action unprecedented in these circles.

DX LADDER

Here are the final listings for 1986, showing first the number of countries confirmed, then the number of QSLs received. Eric Treharne, Bryan Prosser 197/241, Peter Drew 192/265, Warwick Smith 151/214, Don Grantley 145/262, Alan Westcott 108/194, Ray Keen 104/170, Ernie Luff 103/180, Greg Earl 103/166. These listings are for 100 confirmations or more.

That winds it up for this month and this year. Good DX, and all the best, de L3202.

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FEDERAL AND DIVISIONAL MONTHLY NEWS REPORTS

(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

FEDERAL QSL BUREAU

Results of the 1965 Scandinavian Activity Centre (SAC) show the following results: Cw.—VK2AKP; Phone—VK2AKP 105, VK2JZ, 44, Check log LZ2B.

Members of the 1966 Illinois QSO Party held the following: VK3APJ 15/9/35, VK3RJ 8/4/32, Eric Trebilcock, VK3Iwards QSL Manager, Brisbane. A number of QSLs came back from ex VKATE (Willis Island) reiterating his previous advice that he is not the least interested in Amateur Radio any more. All QSLs for him will be returned to the senders. It is a pity that these types get to the south coast after locations and while there enjoy the fellowship that Amateur Radio offers, yet on return to home locations, are unwilling to honor the minor obligations entered into from the remote locations.

Old times in Victoria were delighted to renew old friendships with Dan Wilkinson, ZL2AB, who visited VK again after a gap of two decades to see his mother who has amassed the total of 90 vire years. Dan, as his call sign indicates, is one of the senior Hams in ZL with over 40 years of active handling behind him. After retirement from the Education Dept., Dan settled in New Plymouth which is at the foot of Mt. Egmont. He was keen to contact ZL2BEM in his home town and learn of cold wet windy weather while in Melbourne he was "enjoying" a reputation.

Jack WZCTN, of Amityville, L.I., N.Y., who acts as QSL Manager for a great number of DX stations, has completed the list of the stations he is currently handling, together with those for whom he has acted for in the past. Will he supply the list on application with s.a.s.e. to this Bureau. No QSLs from any of the many venues received by Don Miller in the past two years have been recorded by this Bureau so far.

—Ray E. Jones, VK3RJ, Manager.

NEW SOUTH WALES

The lecture subject for the VK2 Division's November meeting had previously been announced as "Solid State R.F." but during the month it was found that the lecturer (Mr. Ted Bantam), an A.W.A. engineer, was not available. However, to quote one of the latest popular expressions, "not to worry"—our Education Officer (Harold ZAAH) very smartly organised a worthy substitute in Mr. Alan Morris, last year's winner of the "Best Lecture of the Year" award. The lecturer kept the audience well awake and interested with a talk, illustrated by color slides, about the operation of aircraft from the British aircraft carrier, H.M.S. "Ark Royal".

From 1961 to 1963 Mr. Morris had served aboard this vessel in various parts of the world, concluding his service with the rank of lieutenant. It is of course, not possible to give a full report on any lecture in these notes, but we will endeavour to give a resume, of the interesting part of the end of the talk, of our readers who did not have the good fortune to be present.

The main object of the lecture, said Mr. Morris, was to give an outline of what was involved in putting an aircraft into the air with sufficient speed that it flies, and how this is done. It is of course, not possible to give a full report on any lecture in these notes, but we will endeavour to give a resume, of the interesting part of the end of the talk, of our readers who did not have the good fortune to be present.

Under normal circumstances an aircraft takes off from a runway, and is accelerated to make it worthwhile would require a runway of at least 8,000 feet. This distance is obviously impossible, and it is for this reason that the carrier "Ark Royal" for instance, being 810 feet. (Incidentally, it weighs 50,000 tons.) To make up for the lack of runway, a carrier aircraft is accelerated on a catapult. It is 156 feet long and the aircraft has reached flying speed (about 140 knots) by the time it arrives at the end of the catapult. There are two of these devices in "Ark Royal" and such a peak of efficiency has been reached that an aircraft can be launched every five seconds.

For a launching, the ship turns into the wind and increases speed to 30 knots. A helicopter, complete with a party of troops, is hoisted alongside during each launching, ready to rescue the crew of the aircraft should it crash into the sea.

When an aircraft is taking off while a heavy sea is running, the launching is timed for when the bow of the ship is rising, thus giving the aircraft more altitude.

As each aircraft moves under its own power onto the catapult, a large metal panel is hinged upward from the flight deck. This is known as a jet blast deflector and, as its name implies, it prevents the damage along the deck from the jet engines.

One of the gadgets used to fasten the aircraft to the catapult is called a bridle. This is made of wire rope and weighs about a hundredweight. Each time an aircraft is launched the bridle is lost overboard—at a cost of 12 dollars each. As there are normally some 20 launchings a day, this may appear rather a costly waste. However, the view is held that using these brides more often could result in the loss of an aircraft worth several million dollars, to say nothing of the crew.

Now that we have successfully launched the plane, the catapult is retracted and the deck again in one piece. The pilot is guided back to the ship by radar, and when in sight of it he lines himself up with a visual aid on the deck known as deck landing projectors. The aircraft flies in over the stern of the ship, catches an arrester wire with a protruding hook, expends about 10,000 h.p. and comes to rest. If by chance something goes astray with the hook, the pilot "gives out the gun," takes off and flies away, the arrester hook is retracted and the deck is clear. These are made of nylon straps and are sufficient to halt the aircraft.

This procedure was arranged at short notice but the subject was covered thoroughly and, as mentioned early in these notes, maintaining interest and enthusiasm was in the charge of the vote of thanks, which was carried by acclamation.

Eleven new members were accepted into membership of the W.I.A. at the November meeting, as follows: G. S. Kiernan, VK2BKG; C. E. Sims, VK2ABP; K. Brackenbury, VK2ZKJ; R. J. Brown, VK2ZPP; R. Slaney, VK2KJM; D. J. Slade, VKIDS, and the following Associate: L. J. McDicken, C. H. Wall, R. Cameron, J. R. Brown, N. W. Gibson.

Silent Key: During November word was received of the passing of one of our members, J. A. (Jeff) Hodgson, VK2ASL, late of Koorling, via Wagga. One minute's silence was observed during the broadcast of VK2WJ. We have not been able to learn any other details but we take this opportunity on behalf of members of extending sympathy to the bereaved family. At the beginning of the November monthly meeting a minute's silence was observed in memory of the late Don Knoek, ex-VK2NO.

Following recent publicity about cards for non-members being handed by the QSL Bureau, the President (Don RDB) invited further discussion from the meeting. Those who read our Divisional notes in the November issue of "A.R." will remember that an invitation to attend a meeting was issued to anyone who thought they had cause for complaint about any of the Division's services.

The bright side of the deal of discussion but the only complaints aired were those concerning certain non-members and their attitudes towards the QSL Bureau. In fact, a general feeling of the meeting was not very favourable towards these individuals, some of whom apparently have no conscience about using the services of the Institute—providing the Institute foots the bill. Rather than accept the QSL Bureau's offer of handling non-member cards on a voluntary basis, let one such person in particular was continuing his anti-Institute broadcasts when in contact with the Bureau.

The retiring QSL Officer (Syd ZSG) said that some non-members had even given the Division post office box number to DX stations, but these had been denied direct and carried the correct postage he had been in the habit of re-addressing them.

SILENT KEY

It is with deep regret that we record the passing of:

VK2ASL—Jeff Hodgson.
VK3AJG—John Mabbitt.

Complimentary references were made to Syd's untiring efforts on behalf of the QSL Bureau for the past seven years, and his successor (Roger ZZIG) was introduced to the gathering.

In discussing the discussion, the chairman announced that Divisional Council would continue to keep an eye on the QSL position, but in the meantime the present rules would stand.

This month is a most important one, socially, for the VK2 Division, with the annual State Convention and Zone 2 Convention both being held during Australia Day week-end, January 27-29.

The Divisional Convention will commence with the monthly meeting on the Friday evening, January 27, when we understand there will be an interesting programme for the customers. While final details have not been decided, it is quite possible that the Wiles Institute Centre will be open on the Saturday afternoon for afternoon tea and eyeball QSOs. Divisional Council has decided to hold an annual dinner again this year on the Saturday evening at the Centre. In former years this evening was usually a "merch" show, but it will be remembered that last year members were encouraged to make it a social night by taking their wives with them. The result was a success, so that it is hoped even more members will fall in with the same idea on this occasion. After all, what are a few dollars if it means an improved atmosphere with the little lady on the Amateur Radio front. Early booking is important in order that catering arrangements can be finalised. Don de la Cruz, VK2ZG, is the caterer (Mrs. Betty Gerdes), telephone 47-4421, or Bill Lewis, telephone 31-4967, will be pleased to take orders.

The annual field day on the Sunday will, as usual, take place at our transmitter site, and it is hoped that many members will be changing the venue this year, but after considering alternative sites it was decided that Dural still held the advantage. This is the only place where the use of the State property so it is to be hoped everyone will put their best foot forward to make this year's field day a most successful one. We would particularly like to see as many of our country members as possible joining with us for the first time on our first day. And there will be the usual field events, while a special effort is being made for the entertainment of the ladies and children.

As mentioned earlier, the Zone 2 Convention is set down for the holiday week-end in January, and I'm sure the Zone Officer, Max VK2HMK would like to hear from intending patrons.

Other coming events which should be kept in mind are the Gosford Branch's Field Day about the middle of February, and the "do's" at both Urunga and Canberra over Easter.

The good work performed by Amateur Radio operators in times of flood and bush fire emergencies is well known to all, and from a report given to the November meeting, by Stephen, VK2ZG, President of the V.H.F. Group, it would appear that a new and rather novel community service is in the offing. On matters such as the recovery of the wrecked flying foxes, and on release it is hoped they will be tracked to their camp by receiving stations set up on high spots around the area, with the assistance of several mobile units. Apart from preparing the equipment it is now just a matter of waiting for the fruit of our mature and the recovery of the flying foxes. We will all be keeping our fingers crossed for the success of this venture. If it works it will be the occasion for a party given by the v.h.f. boys on their regular fox hunts of a slightly different kind.

The Dural Committee has received a welcome donation to their equipment fund from a donor that well known old timer, Joe Reed, VK2JR. This is a heavy-duty block and tackle, which should be invaluable for raising and lowering masts. The W.I.C.E.N. Committee recently

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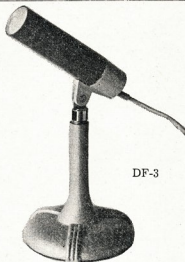
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acquired a 40 ft. mast so we can see Joe's donation being put to good use very shortly.

Now that the Divisional Library is a going concern for the first time in several years, it is the board's duty to make sure it makes full use of this service, at the same time giving all concerned a fair go by keeping to the rules as regards return of books. Unfortunately there are still quite a number of gaps in the lists of several popular overseas periodicals, and it is hoped that members will make donations of these. Filling the gaps would make everyone happy, for it would be disappointing both to the Librarian and the member asking for a certain book, if it is not available. Have a look at page 8 of November Bulletin and see if you can help the Librarian, and please send any requests for books to the Librarian, W.I.A., P.O. Box 154, Crow Nest, NSW.

Our Treasurer, Officer (Harold 2AAH) has issued a reminder about his taped lecture service. This is an excellent opportunity for clubs and other interested groups, or individuals, for that matter, to catch up with some very good lectures that Harold has on tape for your benefit. And what is worth mentioning is that Harold has a good selection of tapes. A list of available lectures was printed in the Bulletin for April 1966, so make four copies of them and bring a line to Harold, C/o the Wireless Institute Centre. While on the subject of services, if you are after Morse tapes, Ern 2EH is the man to contact, while the International Morse Code tapes from the A.O.C.P. Class should write to Cec 2IR, also C/o Wireless Institute Centre.

In concluding this first batch of notes for 1967, may I wish you all a happy and prosperous new year—and if you can spare a couple of dollars, don't forget the I.T.U. Fund! '73, Ivan 2AIM.

CENTRAL COAST BRANCH

The last meeting of the Central Coast Branch was held on Friday, Nov. 11, at the Gosford School of Arts. We were very fortunate to have John Featherstone, K1JUP, of Tucson, Arizona, talk about "New Thoughts in Communicating". His main concern was the electronic research at the University of Sydney and also as a consultant. He was enthralled with the electronic equipment and its various forms and felt that we have still only touched the fringe of the possibilities. He had much praise for the work of Rod Argent, who is in the experimental field and also for the capacity of Australian technicians. It was a great pleasure to listen to John, for apart from his interesting presentation, he has been well-served by Australianists was very pleasant to the ear. Many thanks John.

Our Secretary, Amos 2JZ, has just returned from an extensive tour of New Zealand when he met some of the voices we hear on the air. We hope to hear more about it when he has had a chance to catch up on his work.

Our Field Day will be held at Gosford on Nov. 19, 1967. We always have some interstate visitors so mark this on your calendar in case you are planning a trip this way. '73, Mona 2AXS.

VICTORIA

EASTERN ZONE

There is still some quite good activity on the air, and the members are busy keeping the bands and nets occupied. Evidently quite a number of fellows in the Latrobe Valley are working in the field, and are brewing and others letting the manufacturers do the hard work. There have been two s.w.i.t. sit for the L.A.O.C.P. in October, namely Albert 2CZ and Trevor 2CZ. The results have been to their liking—the more the merrier on the bands, or it is more QRM.

The 2 mx f.m. net is quite active along the Prince's Highway, and members are keen. I was such as George Francis, of Morwell (phone 43953) are always willing to help in whatever way they can. The present results of the Amateur air. George has been having quite good contacts into western VK2, to VK2, VK3, and VK7, so far, and is giving a mere 2 mx f.m. net. There are a couple of chaps in the Western Zone who will be pleased to work DX on two, Roy 3ZYG at Enniskillen and Jim 4CZ at Melbourne, who are recent L.A.O.C.P. winners, as well as the old hands. If you want some DX on the v.h.f. try 4 mx you should get some good DX. I believe that JAs have been heard in Melbourne recently, could be a really good year. 15 and 10 mx have also been extremely good, and have been giving 10 QSOs in a bit of time, as well as 20.

The Eastern Zone met on a Friday night on 20th Nov. and had a very good time, but don't forget the more the merrier, and

its a chance to get to know your fellow Zone members. Sideband seems to be becoming the order of the day with quite a large number of the Zone members using this mode of operation, the exact percentage I don't know. Most appear to have commercial gear, although some are building their own. Shame on us for not having a commercial gear, but I hope to be on the air fairly soon with an s.b. transceiver, so should put out a good signal on the G4 net.

Cliff 2AIT is still very busy on C.F.A. radio networks and when at work is head down, tail up, working on the automatic control gear at 3GL. As a result, the s.b. rig has had to take second place for a few months. Keith 3AED is a very keen home-brewer and is now in the process of designing and building a transceiver for the 30 MHz band. I am not sure what power it will run, but I suspect that it will take enough power to put a quite reasonable signal into itself by itself and much further with a linear. John 3AED is doing some experiments with d.s.b., so instead of being only able to tune one sideband, we'll be able to take our pick. What about making it s.b. and we'll be able to take our pick of programmes.

George 3ZCG has kindly offered to take over my J-b of Zone correspondence. I have moved out of the Zone in fact, perhaps I'll be the Zone correspondence for a while. I'll be for the call sign VK0CR, the voice of Macquarie Island. I'll be active on 20 about 14100 and on 8 mx on 33,800. The latter is a bit of a joke, which I will be reading in "A.R." by this stage. With a little bit of luck we'll hook up on 6.

Remember, early in the new year is the Zone Convention, which I believe is being held in Sale. All the best in the Zone, fellas, hope to work many of you on the air and I hope the time you give will be well worth you can for the notes, particularly the h.f. news; George has his finger fairly well on the h.f. activity, and I'll be writing for you, George, J3, Rodney 3UG.

SOUTH AUSTRALIA

The usual author for these notes, the most read writer of this magazine, Warwick 6FS, Pansy to you, has been taken to hospital and thus lays himself open to an extra attack by the weather. I am sure that he will be able to stand in for him. First of all we hope that he will make a complete and speedy recovery and return to his normal state of health. We hope he will be able to make suitable reply to any slender cast in his direction. It is felt that the VK0CZ activity is not as good as it was. Possible comments are not available!

It is wondered if the visit of Fred 3YS, as reported in a previous issue, complete with a black box that issued a "no" reply, could be contributed to the "no" reply, although it is understood that Warwick's XYL did suggest that he procure one of those things "and thus join the strength".

Reading the leader in November '66 "A.R." must make most of us think deeply about the necessity of setting up a "no" reply, and the need of which will not escape any member who stops long enough to consider the road ahead.

At present, in spite of the annual subscription, and the activities conducted by the W.I.A., and they are vast, are done on a "no" reply basis. Both State and

Just consider some State work. QSL card receipt and distribution for one. For VK3 3ZYG, this is a very good job, and a very magnificent job, handling thousands of cards each year, keeping your costs down, maintaining records of your cash position, with him, sorting out the cards for collection, earning them to the meetings for distribution, mailing others, and so on. Extra to that he provides a very interesting segment for the Divisional Broadcast each Sunday. George really does his bit.

Brian 3ZG, a genial editor and publisher of the S.A. Journal, is another who puts in endless time for the membership. Next time you receive your copy of the Journal, work with him to the effort to make it a better publication, printing, folding, mailing, etc., and ask whether you have offered to assist in any way. It is highly probable that you will be one of the band of helpers do for the love of the game. Yes, Brian really does his bit.

The Sunday morning broadcast of the Divisional Council, which is a very good thing, deserves better support. Don't leave it to him to "find the news," feed it to him. The session cast on him, and the coverage of the general membership don't become contributors. Murray also does his bit.

And so we could go on to Phil 5NN and his 2000 ft. h.b. for the 30 MHz band, and the Council and the time they spend in general

administration work on our behalf. Eric 5ZEX and his v.h.f. notes for the session, Geoff 5TV and his band of W.I.C.E.N. enthusiasts, and so on. Expand this to each Division, and add to it the general membership of the Federal level when it is easily seen that the amount of volunteer time expended on behalf of general membership is vast, and the main part expended by a dedicated few.

Why are we hammering this aspect this much? The answer is that we need more people to support those who are guiding us at present, that we will take more interest in the work that lays ahead, that we will try and influence the general membership of the I.T.U. as well as numerically add to the weight of our voice, and that by so doing we will finish up with our membership in a very good way. Help Region become a voice in I.A.R.U.

Finally, on this matter, don't overlook our obligation to subscribe to the I.T.U. for which we must be well represented at the conference, and this costs money. You may have already sent in your donation, if so OK, but if not it is not too late to do so.

Divisional Council membership is subject to nomination now, you will soon receive a Journal to this effect. When you do, make it a point to suggest some of the names for nomination the better, for we want to keep our Division active and progressive.

A new department recently started for the Melbourne Victorian Division is the "Supporting Group". This is a group of chaps who are prepared to go to the assistance of any enquiry and help in the erection and testing of equipment, and in the training of the younger members, but anyone wanting help. Being experienced they will short cut and get the job done in a very short time. Enquire from the Secretary.

Have been keeping an ear to the ground wave on 40 and 80 these last few days in the effort to find a way to get a signal to run across. Carl 5SS, Frank 5MZ with some of their cobsers from across the border and that perpetual optimist, 5WG, who was heard exclaiming "the signal is coming, it's coming, it's never arrive, be like me, always look on the bright side." To which philosophy all the other fellows in the group agreed. I'll be to 7050 and I'll offer even money the frequency will be occupied by Jack 5LQ with his old fashioned modulation. I'll be to 7050 using "the thing". Tried to get through to the other end of the drain fellows, but no go—how about turning up that r.f. gain

Had a few words with Ken 5IM the other teatime just as his XYL called "come and get the kids" and I stayed on enough to pass some kind remarks about my "no" reply. He said that he had been keeping his schedule with 2AXL-2AHM three times a week for the best part of 10 years. For one year he had a short hook-up with Col 5RO. Was one of my most regular QSOs on 8 once but since the change to 32 Mc. Col has been missing a lot of the band. Better scrape that 2 megs off the xtal, Col, the JAs will soon be pouring in.

Anybody work that DX-peddler Arch 5XK? I've seen the fellow in the Wharfedale Park dock, and he's a real character.

Sunday, Nov. 27, the S.A. V.h.f. Picnic was held in glorious weather at the Wharfedale Park. Earlier on, WI broadcast all and sundry were invited to rendezvous at Belair and enjoy the hospitality of the WI. The picnic was a very good one and lasted till very late in the afternoon, but was made welcome and a quick count revealed 38 members and 100 visitors. Many thanks to the organisers.

Garry 5ZK and Geoff 5TV were notified "glumming" it with several Z types and Ross 5ZF, over a Freshie. The latter was turning the scene with a very contented look on his face. Or was he merely watching the very fair examples of S.A. pulchritude as they passed by? Did anyone notice the WI Picnics were never so well attended? What do the v.h.f.ers have that the h.f.ers haven't? Don't know.

Heard Vern 5VB "conning" yet another one into building a quad the other night. Vern must have influenced more blokes into putting up a quad than any other bloke in the area. But watch out Vern, my admiral, Bert 5SW out Elizabeth way has come up with a version of the modified G4ZU on an X frame that will allow you to do more than a quad.

What's this business of feeding an antenna with "iron ants"? Uncle Joe, 5UJ, up in Whyalva, claims wonderful results and when asked to show the teaming ants he said "oh, Christmas who knows what might happen."

That earthwile exponent of 288, Don 5LO, mentions that he has been working the 30 MHz Don was 3PO for a year or two and now signs

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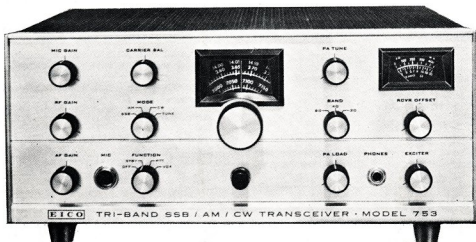
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